The Builder.

VOL. XVI.—No. 788.

Housing the Army—St. George's Barracks—The Tower.

NINE or ten correspondents have addressed us on the condition of barracks in England, forwarding statements in confirmation of the observations in our last,* and imploring—the word is their own—a continuance of the examination then commenced. All agree that we have understated rather than overstated the dreadful results of the present system. "I have perused your article," says Mr. John Roberton, of Manchester, with whose essay on the arrangement of hospitals our readers are acquainted, "and examined the sketches with attention and the deepest interest. In one particular you understate the appalling facts. The 20·4 deaths per 1,000 annually in the Foot Guards are only the deaths in barracks, and do not include the large number of deaths, *barrack-produced*, in the soldiers being continually sent off invalided. Were these latter deaths added to the barrack deaths, the rate would be 30 instead of 20 per 1,000, perhaps. What a subject is this of our barrack dormitories! I rejoice to see that you have taken the matter up, and that you will pursue it in future numbers of the *Builder*. It is amusing to notice that the report is silent as to the rate of death among the commissioned officers. Depend on it, *they* don't die as the rank and file do, or we should have had a better sanitary state of the barracks long ere this: if the commissioned officers had died at the rate of even 10 per 1,000, the War-office would long ere now have been brought to its senses. As Sidney Smith said of railway accidents,—if a bishop were to be killed in a railway accident, provision would be made with wonderful diligence against their recurrence,—so we may say of barracks: if the officers had suffered, along with the common soldiers, you would not have had *now* to write articles on the subject."

Long before the Commissioners who have recently reported were appointed, we said that "If full examination of all barracks in which British troops are quartered were ordered, and a truthful report drawn up, the world would be startled at the horrible revelations made;" and we asserted that "there are barracks in which the soldiers are never healthy, and hospitals in which the sick never get well." This will be believed now, though it was scoffed at then. The evils of the ill-constructed and overcrowded barrack-room cannot be mitigated by its tenants, and are constant in their operation, lowering health, and ultimately destroying life.

There is no reason why barracks should be less healthy than ordinary habitations, but the reverse. In the model lodging-houses of the metropolis, arranged with a view to health, the rate of mortality is not half so large as it is amongst the general population. "To the objection," says the *Times*, in one of the series of able articles in which it has sought to bring forcibly before the general public the report of the Commissioners, "to the objection that these results are only shown in buildings which, like the model lodging-houses, have been constructed expressly with a view to health, the Commissioners justly reply that a regard for health should govern the construction of barracks also. Their present inferiority to the common lodging-houses, the casual refuge of the tramp, the outcast, and the vagabond, does not admit even this poor apology; the object of the owners or 'farmers' of this class of houses was only to obtain the largest possible amount of nightly rent from the largest number of inmates. Yet 'due intelligence,' invested with due power, has purified their abominations, spite of all defects of construction. The military authorities have required no addition of powers, no Acts of Parliament, no delegation of functions to the police; they have no opposition from greedy landlords to overcome; yet the state of things under their control is what the report describes. In truth, the whole of this section of the document is a strong indictment of the War Department, as proprietors and keepers of soldiers' lodging-houses, for permitting all the nuisances proscribed by the Act regulating the lodging-houses of the metropolis."

Continuing our examination, let us look at *St. George's Barracks*, one entrance to which is afforded by the westernmost opening through the National Gallery, in Trafalgar-square. There is a considerable open space here, and the barracks have the reputation of being amongst the best in the metropolis. The accommodation provided for the men consists of a long range of buildings, four stories high, above the ground, with rooms below the surface, not used at present for dwellings, but for pipe-claying and other cleansing operations. The whole length of the building is divided into separate parts, which have distinct entrances, both from the front and back. The staircases are wide, and on the right and left are apartments, each of which forms a home for from sixteen to seventeen men. These rooms are fitted with the necessary number of beds. The soldiers' arms and other accoutrements are hung around. A large table is in the centre; and so closely are the beds placed together, that when they are prepared for the night, but little room is left for moving about. The published return gives 390 cubic feet as the space allowed for each man,—not half what it should be. The fact is, however, that the provision of cubic space alone is not sufficient: there must be *area*, the beds must be at a greater distance apart. The rooms are not more than 11 feet in height; the windows are at each end of the rooms, and admit sufficient light, but all of them were closed. There is also a fire-place in each apartment; and, with the exception of this, the only other means of ventilation are four apertures (closed) in the ceiling of each room, which communicate with a grating in the outer wall, and, as there is no other arrangement for bringing *in* air, of course operate in that way instead of in removing the vitiated air. And, the rooms being comparatively low, this method of letting in air is objected to by most of the soldiers, who say that when lying in bed those near the openings are constantly catching cold, in consequence of the wind blowing down upon them in a current.

When we look at these rooms, and compare them with the space of the wards of some of the most old-fashioned of the London hospitals, full of evils of their own as these are, it is not possible to fail to be struck with the difference.

At about eleven o'clock in the morning, although a considerable number of the soldiers were out at drill, the atmosphere of the rooms, which serve for the purpose of both sleeping and dining, was heavy and offensive; doors and windows were closed, and the stagnated condition of the air proved that the ventilation by the ceiling was quite insufficient. In the wards of Bartholomew's Hospital, even in the winter time and at night, some of the windows are kept open at the top, the authorities knowing that there is more danger, even as regards diseases of the lungs, from polluted air, than from a plentiful supply of wholesome air. Such of the soldiers as we inquired of seemed to be afraid of draughts; nor is this to be wondered at, considering that they have been for so long accustomed to close rooms, filled with heated poisonous air. No one should be surprised at the men catching cold when they leave such an atmosphere in the night or in inclement seasons, to mount guard.

There is a library here, and we were glad to learn that when the barracks are fully occupied as many as 300 soldiers subscribe towards its support. The pleasure of a visitor, however, is damped, on visiting the library, to find it placed in an apartment of the same size as the sleeping-rooms already mentioned, and just as much care taken there to exclude the air as in the other places. The room, as represented by our sketch last week, fig. 3, was crowded, some reading, others playing at dominoes and similar games. A thick crowd stood round the fire, and the scene was at any rate very picturesque. We are told that in wet or bad weather (when the air is more oppressive than usual), from 150 to 200 soldiers will take shelter here and amuse themselves. It seems extraordinary that in this enlightened age the medical officers of a regiment should allow such a number to congregate in so inadequate a space, so ill cared for as regards ventilation. In the prisons no such defiance of those sanitary arrangements which are necessary for the preservation of health is permitted.

There is here a school for teaching both the adults and children of the regiment, and an infant school: in the latter, both space and ventilation are insufficient.

The closets are ranged at the back of the barracks, at no great distance from the windows, and are flushed *once a day*, by means of a contrivance which throws in a large quantity of water; but during a whole day and a night matters are allowed to remain in a condition manifestly dangerous, when we consider that at times from 700 to 1,000 persons are lodged here: there is no proper covering to the closets, and pans and traps are imperatively necessary.

Although the rooms here are much too low, and not of sufficient size for the number of those who sleep in them, great improvements might be made at little trouble and cost. During some portion of each day the rooms should be unoccupied, the windows and doors thrown open, and fresh air be allowed to play through the place for an hour and upwards. At no time during the day should the windows be entirely closed,—only a quarter of an inch at the top of each would do much good, and the current, by passing above the heads, would not do harm. Air should be admitted, too, at the bottom of the room. The upper row of glass in the window should be so perforated as to throw the air upwards. The ventilators in the ceiling should not be allowed to throw strong streams of air in the night time in particular directions. We notice that there are strings connected with these, and have no doubt that opportunities are taken at night to close them, and then it is easy to imagine the condition of the air in the course of a few hours, and how dangerous it must be to leave such a place suddenly to face cold or wet weather.

The library and reading-room should be at least twice its present size, and properly ventilated, and then it might be a place where the men could pleasantly and usefully spend their

* See p. 149, *ante*.

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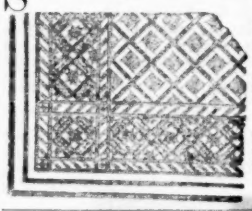

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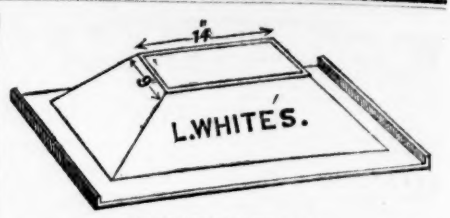

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When we look at these rooms, and compare them with the space of the wards of some of the most old-fashioned of the London hospitals, full of evils of their own as these are, it is not possible to fail to be struck with the difference.

At about eleven o'clock in the morning, although a considerable number of the soldiers were out at drill, the atmosphere of the rooms, which serve for the purpose of both sleeping and dining, was heavy and offensive; doors and windows were closed, and the stagnated condition of the air proved that the ventilation by the ceiling was quite insufficient. In the wards of Bartholomew's Hospital, even in the winter time and at night, some of the windows are kept open at the top, the authorities knowing that there is more danger, even as regards diseases of the lungs, from polluted air, than from a plentiful supply of wholesome air. Such of the soldiers as we inquired of seemed to be afraid of draughts; nor is this to be wondered at, considering that they have been for so long accustomed to close rooms, filled with heated poisonous air. No one should be surprised at the men catching cold when they leave such an atmosphere in the night or in inclement seasons, to mount guard.

There is a library here, and we were glad to learn that when the barracks are fully occupied as many as 300 soldiers subscribe towards its support. The pleasure of a visitor, however, is damped, on visiting the library, to find it placed in an apartment of the same size as the sleeping-rooms already mentioned, and just as much care taken there to exclude the air as in the other places. The room, as represented by our sketch last week, fig. 3, was crowded, some reading, others playing at dominoes and similar games. A thick crowd stood round the fire, and the scene was at any rate very picturesque. We are told that in wet or bad weather (when the air is more oppressive than usual), from 150 to 200 soldiers will take shelter here and amuse themselves. It seems extraordinary that in this enlightened age the medical officers of a regiment should allow such a number to congregate in so inadequate a space, so ill cared for as regards ventilation. In the prisons no such defiance of those sanitary arrangements which are necessary for the preservation of health is permitted.

There is here a school for teaching both the adults and children of the regiment, and an infant school: in the latter, both space and ventilation are insufficient.

The closets are ranged at the back of the barracks, at no great distance from the windows, and are flushed *once a day*, by means of a contrivance which throws in a large quantity of water; but during a whole day and a night matters are allowed to remain in a condition manifestly dangerous, when we consider that at times from 700 to 1,000 persons are lodged here: there is no proper covering to the closets, and pans and traps are imperatively necessary.

Although the rooms here are much too low, and not of sufficient size for the number of those who sleep in them, great improvements might be made at little trouble and cost. During some portion of each day the rooms should be unoccupied, the windows and doors thrown open, and fresh air be allowed to play through the place for an hour and upwards. At no time during the day should the windows be entirely closed,—only a quarter of an inch at the top of each would do much good, and the current, by passing above the heads, would not do harm. Air should be admitted, too, at the bottom of the room. The upper row of glass in the window should be so perforated as to throw the air upwards. The ventilators in the ceiling should not be allowed to throw strong streams of air in the night time in particular directions. We notice that there are strings connected with these, and have no doubt that opportunities are taken at night to close them, and then it is easy to imagine the condition of the air in the course of a few hours, and how dangerous it must be to leave such a place suddenly to face cold or wet weather.

The library and reading-room should be at least twice its present size, and properly ventilated, and then it might be a place where the men could pleasantly and usefully spend their

* See p. 149, *ante*.

TO ARCHITECTS', BUILDERS', and ENGINEERS' SONS, ASSISTANTS, &c.—There is a VACANCY in Mr. HILL'S EVENING CLASS for TWO or THREE PUPILS, to learn Architectural, Mechanical, and Civil Engineering Drawing. Terms, 1*l.* 10*s.* per quarter.—For prospectuses, apply at the Offices, 13, Old-street, City-road, E.C.

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MATHEMATICAL DRAWING INSTRUMENTS.—JOHN ARCHBUTT, 20, Westminster-bridge-road, Lambeth (S.), near Astley's Theatre, begs to call attention to his Stock of Instruments manufactured by superior workmen. The prices will be found considerably lower than ever charged for articles of similar quality and workmanship. Rules, scales, tapes, &c. at equally low prices. An illustrated price-list will be immediately forwarded, free, on application.

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Recommended in "The Engineer," "Builder," and "Practical Mechanics' Journal." 42-inch, 5*s.* and 7*s.* 6*d.*; 31-inch, 3*s.* 6*d.* and 5*s.* 6*d.*; 23-in. 2*s.* 6*d* and 4*s.*

Isogon Squares, for Taking and Reversing Angles.

Improved Architects' Scales, 12-in. box, 2*s.* 9*d.* ivory, 8*s.*

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LONDON, W.C.

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March 2, 1858. G. W. HEISCH, Secretary.

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Scaffolding, Ladders, Barrows, Steps, Trestles, &c. Lent on Hire.

The new Price Lists are now ready, and will be forwarded on application.

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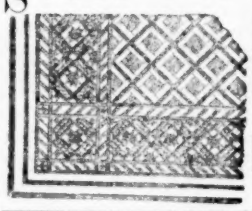

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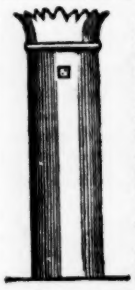

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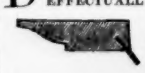

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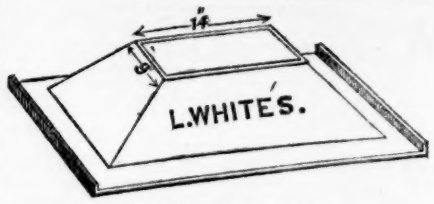

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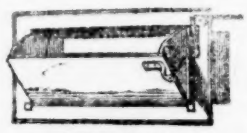

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These Ventilators are arranged that the requisite quantity of air may be admitted for the due ventilation of an apartment without the slightest draught being felt by the occupants; and as they are placed in the external wall, their action is not impeded when the house is closed for the evening, at which time a constant supply of fresh air is most required.—HAYWARD, BROTHERS, sole Manufacturers, 196, Blackfriars-road, and 117, Union-street, Borough; and of all respectable Ironmongers, Builders, &c.

BRICKS.—Mr. RYDON having made more Bricks than he requires for the buildings, on his Highbury New Park Estate, is willing to make arrangements with builders and others for SUPPLYING a quantity of first-class BRICKS of every description.—Address, Estate Office, Dell's Farm, Stoke Newington-green.

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Malm Place, half-washed Stocks, and Place Bricks, also on sale. These bricks are sound, well burnt, and unusually free from defects; a very large proportion of the stock being suitable for external facing.

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BRICKS.—Messrs. OATES and INGRAM inform Brick-makers on an extensive scale, that their PATENT SOLID BRICK MACHINE is now thoroughly and efficiently tested, and they are prepared to offer the following counties to the trade, in DISTRICTS, either by ROYALTY or PURCHASE:—MIDDLESEX, SURREY, SUSSEX, ESSEX, KENT, NORFOLK, SUFFOLK, CAMBRIDGE, OXFORD, GLOUCESTER, HERTFORD, BERKS, HUNTINGDON, DEVON, CORNWALL, DORSET, WILTS, HANTS, and ISLE of WIGHT. With this Patent Machine the ordinary surface-clay requires no preparation whatever; whilst that of a rocky nature has merely to be passed through rollers in the usual way, and thence, WITHOUT ANY TEMPERING, INTO THE MACHINE, FROM WHICH THE BRICKS ARE REMOVED DIRECT TO THE KILN IN A STATE READY FOR BURNING. The Machine is now making upwards of THIRTY BRICKS PER MINUTE, at the Works of Messrs. Kirk and Parry, Government Contractors, Fort Elson, near Gosport; and also at the Patent Solid Brick Works of T. Wells Ingram, Oldbury, near Birmingham.—Application for orders to see the Machine in operation to be made to OATES and INGRAM, Bradford-street, Birmingham. Samples of clay may be sent and passed through the Machine, and the bricks burnt, or a sample brick will be sent to any party wishing to see one.

JOHN NEWTON and CO. HONDURAS WHARF, 74, BANKSIDE, Southwark, S.E. Fire-bricks, Lumps, and Tiles of every description (seventeen years with James Newton, of Falcon Dock, Bankside), beg to solicit the patronage of Consumers, Gas Companies, Engineers, Builders, &c. &c. Depot for Ramsay's superior Newcastle Fire-bricks, Clay Retorts, &c. Sanitary Pipes, Chimney-tops, Dutch Clinkers, &c. at the lowest prices. Shipping orders executed with despatch.

PEAKE'S TERRO-METALLIC TILES, PIPES, &c.—Notice is hereby most respectfully given, that the LONDON DEPOT for this ware is REMOVED to No. 21, WHARF, Macclesfield-street North, City-road Basin (N.). 2ndly, that the trade term, "TERRO-METALLIC," is the exclusive right of the Proprietor; and 3rdly, that the "Reports of the Juries," page 581, of the Great Exhibition, note the grant of a First-class Medal, and rank the Manufactories known so long as "The Tileries," Tunstall, Staffordshire, as the first of the kind in the world.

IMPERISHABLE TESSELATED PAVEMENTS, combining a highly decorative and economical substitute for ordinary floors of their perishable coverings. MAW and CO.'S pattern-book, designed by M. Digby Wyatt, esq. together with a special design and estimate of cost, adapted to any given dimensions of hall, passage, conservatory, veranda, frieze, &c. will be sent on application to Benthall Works, Broseley, Salop.

PATENT TERRA-COTTA. Tracery for Parapets and Terraces, Mullions, Pinnacles, Moulded Bricks, Coats of Arms, Crosses, Label Mouldings, Friezes, Trusses, Vases, Balusters, Capitals and Bases of Columns, Paving, Facing Bricks, Coping, Kitchen and other Sinks, Chimney Shafts and Tops, and numerous other Articles, manufactured by J. M. BLASHFIELD, in Patent imperishable Terra-Cotta, at Mill-wall, Isle of Dogs; and sold at No. 1, Wharf, Praed-street, Paddington-basin.

AUSTIN, SEELEY, and CO. beg leave to remind ARCHITECTS that they have always a large number of Figures of Lions and other animals, both couchant and standing, suitable as ornaments for gardens or for edifices. The largest size which they have hitherto modelled is 10 feet high.—371 to 375, Euston-road, formerly Keppel-row, New-road.

The Builder.

VOL. XVI.—No. 788.

Housing the Army—St. George's Barracks—The Tower.

NINE or ten correspondents have addressed us on the condition of barracks in England, forwarding statements in confirmation of the observations in our last,* and imploring—the word is their own—a continuance of the examination then commenced. All agree that we have understated rather than overstated the dreadful results of the present system. "I have perused your article," says Mr. John Roberton, of Manchester, with whose essay on the arrangement of hospitals our readers are acquainted, "and examined the sketches with attention and the deepest interest. In one particular you understate the appalling facts. The 20·4 deaths per 1,000 annually in the Foot Guards are only the deaths in barracks, and do not include the large number of deaths, *barrack-produced*, in the soldiers being continually sent off invalided. Were these latter deaths added to the barrack deaths, the rate would be 30 instead of 20 per 1,000, perhaps. What a subject is this of our barrack dormitories! I rejoice to see that you have taken the matter up, and that you will pursue it in future numbers of the *Builder*. It is amusing to notice that the report is silent as to the rate of death among the commissioned officers. Depend on it, *they* don't die as the rank and file do, or we should have had a better sanitary state of the barracks long ere this: if the commissioned officers had died at the rate of even 10 per 1,000, the War-office would long ere now have been brought to its senses. As Sidney Smith said of railway accidents,—if a bishop were to be killed in a railway accident, provision would be made with wonderful diligence against their recurrence,—so we may say of barracks: if the officers had suffered, along with the common soldiers, you would not have had *now* to write articles on the subject."

Long before the Commissioners who have recently reported were appointed, we said that "If full examination of all barracks in which British troops are quartered were ordered, and a truthful report drawn up, the world would be startled at the horrible revelations made;" and we asserted that "there are barracks in which the soldiers are never healthy, and hospitals in which the sick never get well." This will be believed now, though it was scoffed at then. The evils of the ill-constructed and overcrowded barrack-room cannot be mitigated by its tenants, and are constant in their operation, lowering health, and ultimately destroying life.

There is no reason why barracks should be less healthy than ordinary habitations, but the reverse. In the model lodging-houses of the metropolis, arranged with a view to health, the rate of mortality is not half so large as it is amongst the general population. "To the objection," says the *Times*, in one of the series of able articles in which it has sought to bring forcibly before the general public the report of the Commissioners, "to the objection that these results are only shown in buildings which, like the model lodging-houses, have been constructed expressly with a view to health, the Commissioners justly reply that a regard for health should govern the construction of barracks also. Their present inferiority to the common lodging-houses, the casual refuge of the tramp, the outcast, and the vagabond, does not admit even this poor apology; the object of the owners or 'farmers' of this class of houses was only to obtain the largest possible amount of nightly rent from the largest number of inmates. Yet 'due intelligence,' invested with due power, has purified their abominations, spite of all defects of construction. The military authorities have required no addition of powers, no Acts of Parliament, no delegation of functions to the police; they have no opposition from greedy landlords to overcome; yet the state of things under their control is what the report describes. In truth, the whole of this section of the document is a strong indictment of the War Department, as proprietors and keepers of soldiers' lodging-houses, for permitting all the nuisances proscribed by the Act regulating the lodging-houses of the metropolis."

Continuing our examination, let us look at *St. George's Barracks*, one entrance to which is afforded by the westernmost opening through the National Gallery, in Trafalgar-square. There is a considerable open space here, and the barracks have the reputation of being amongst the best in the metropolis. The accommodation provided for the men consists of a long range of buildings, four stories high, above the ground, with rooms below the surface, not used at present for dwellings, but for pipe-claying and other cleansing operations. The whole length of the building is divided into separate parts, which have distinct entrances, both from the front and back. The staircases are wide, and on the right and left are apartments, each of which forms a home for from sixteen to seventeen men. These rooms are fitted with the necessary number of beds. The soldiers' arms and other accoutrements are hung around. A large table is in the centre; and so closely are the beds placed together, that when they are prepared for the night, but little room is left for moving about. The published return gives 390 cubic feet as the space allowed for each man,—not half what it should be. The fact is, however, that the provision of cubic space alone is not sufficient: there must be *area*, the beds must be at a greater distance apart. The rooms are not more than 11 feet in height; the windows are at each end of the rooms, and admit sufficient light, but all of them were closed. There is also a fire-place in each apartment; and, with the exception of this, the only other means of ventilation are four apertures (closed) in the ceiling of each room, which communicate with a grating in the outer wall, and, as there is no other arrangement for bringing *in* air, of course operate in that way instead of in removing the vitiated air. And, the rooms being comparatively low, this method of letting in air is objected to by most of the soldiers, who say that when lying in bed those near the openings are constantly catching cold, in consequence of the wind blowing down upon them in a current.

When we look at these rooms, and compare them with the space of the wards of some of the most old-fashioned of the London hospitals, full of evils of their own as these are, it is not possible to fail to be struck with the difference.

At about eleven o'clock in the morning, although a considerable number of the soldiers were out at drill, the atmosphere of the rooms, which serve for the purpose of both sleeping and dining, was heavy and offensive; doors and windows were closed, and the stagnated condition of the air proved that the ventilation by the ceiling was quite insufficient. In the wards of Bartholomew's Hospital, even in the winter time and at night, some of the windows are kept open at the top, the authorities knowing that there is more danger, even as regards diseases of the lungs, from polluted air, than from a plentiful supply of wholesome air. Such of the soldiers as we inquired of seemed to be afraid of draughts; nor is this to be wondered at, considering that they have been for so long accustomed to close rooms, filled with heated poisonous air. No one should be surprised at the men catching cold when they leave such an atmosphere in the night or in inclement seasons, to mount guard.

There is a library here, and we were glad to learn that when the barracks are fully occupied as many as 300 soldiers subscribe towards its support. The pleasure of a visitor, however, is damped, on visiting the library, to find it placed in an apartment of the same size as the sleeping-rooms already mentioned, and just as much care taken there to exclude the air as in the other places. The room, as represented by our sketch last week, fig. 3, was crowded, some reading, others playing at dominoes and similar games. A thick crowd stood round the fire, and the scene was at any rate very picturesque. We are told that in wet or bad weather (when the air is more oppressive than usual), from 150 to 200 soldiers will take shelter here and amuse themselves. It seems extraordinary that in this enlightened age the medical officers of a regiment should allow such a number to congregate in so inadequate a space, so ill cared for as regards ventilation. In the prisons no such defiance of those sanitary arrangements which are necessary for the preservation of health is permitted.

There is here a school for teaching both the adults and children of the regiment, and an infant school: in the latter, both space and ventilation are insufficient.

The closets are ranged at the back of the barracks, at no great distance from the windows, and are flushed *once a day*, by means of a contrivance which throws in a large quantity of water; but during a whole day and a night matters are allowed to remain in a condition manifestly dangerous, when we consider that at times from 700 to 1,000 persons are lodged here: there is no proper covering to the closets, and pans and traps are imperatively necessary.

Although the rooms here are much too low, and not of sufficient size for the number of those who sleep in them, great improvements might be made at little trouble and cost. During some portion of each day the rooms should be unoccupied, the windows and doors thrown open, and fresh air be allowed to play through the place for an hour and upwards. At no time during the day should the windows be entirely closed,—only a quarter of an inch at the top of each would do much good, and the current, by passing above the heads, would not do harm. Air should be admitted, too, at the bottom of the room. The upper row of glass in the window should be so perforated as to throw the air upwards. The ventilators in the ceiling should not be allowed to throw strong streams of air in the night time in particular directions. We notice that there are strings connected with these, and have no doubt that opportunities are taken at night to close them, and then it is easy to imagine the condition of the air in the course of a few hours, and how dangerous it must be to leave such a place suddenly to face cold or wet weather.

The library and reading-room should be at least twice its present size, and properly ventilated, and then it might be a place where the men could pleasantly and usefully spend their

* See p. 149, *ante*.

SANITARY ARRANGEMENTS FOR THE SOLDIER.

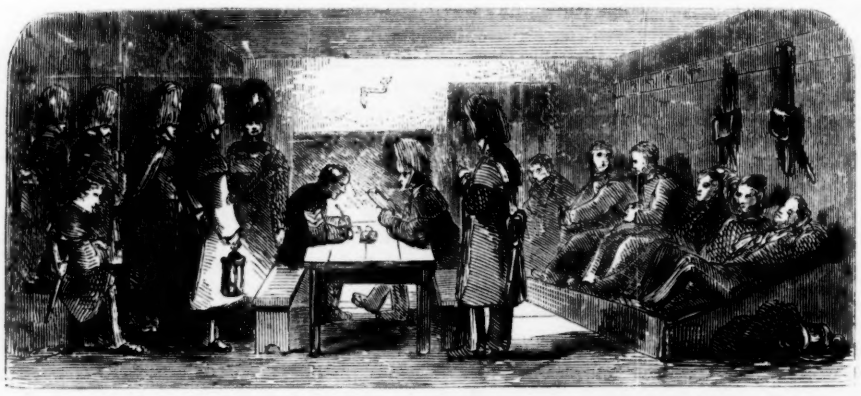


FIG. 4.—*The Guard Room at Night, Portman-street Barracks.*

FIG. 5.—*Married Soldiers' Quarters, Albany-street Barracks.*

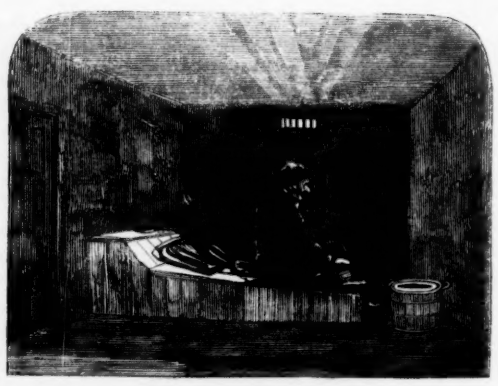


FIG. 6.—*Black-hole for the Cavalry, Knightsbridge Barracks.*

spare hours. As it is at present, they get more harm than good by attending there.

While examining these arrangements, and making other inquiries, we could not avoid comparing the improved intelligence of the soldiers of the present day with the veterans of the long war: nevertheless, the efforts of our army in the Crimea and elsewhere, show that increased knowledge and better habits have not lessened their bravery.

The *Tower of London*, so rich in associations, and which from a remote time has been amongst the most noted of the strongholds of England, has, during the last twenty or thirty years, undergone great changes. Long ranges of buildings have been placed on the site of those destroyed by the last fire, and these, like many other modern fortresses, remind one most of the scene-painter's conventional Gothic castle. In one point of view, nevertheless, improvement has been made in the arrangements of these barracks, which are much better than some which have been mentioned. The rooms are larger, and the number of men in each less, and here we find the natural results. Since the return from the Crimea of the Fusilier Guards, who are now quartered here, they have been at Windsor and the Tower, and although the neighbourhood of the Thames is not considered very salubrious, the ratio of deaths has been much less than in Portman-street and St. George's barracks. When we consider that the men who form our regiments of Guards are in the prime of health and strength, it is, nevertheless, much too high. The report contains evidence of improvement in health and saving of life following the draining of the ditch and the provision of better barracks.

In addition to the overcrowded living-rooms, much damage is done in the guard-rooms, which are too small for the purpose of holding at times from forty to fifty men during the night. In some of these places doors and windows are closed, and there is no other ventilation than the chimney. Wooden boxes, like those in casual wards of the workhouses, are provided for the men to rest upon, and in wet weather they often lie down in their wet cloaks, and the place becomes filled with damp steam and other unwholesome vapours. Our sketch, fig. 4, shows the guard-room at Portman-street at night, as sketched on the spot.

Some veteran soldiers seem to think that much damage to the soldiers is caused by the make of the clothing, the tight belts, the padding and close buttoning over the chest, the uncomfortable fitting stocks, and the peculiar way of wearing the knapsacks; and this may be in some measure true, for we find that in the horse regiments, where knapsacks are not carried, the average mortality is less; however, the large number of deaths even in the horse regiments, shows that the mortality must be attributed to other causes.

It has been suggested to us that much good would be done if in barracks, or close to them, rooms were erected for the lodgings of married soldiers who cannot at present be accommodated in barracks, and who have to pay highly for small and inconvenient rooms elsewhere. They would be willing, it was thought, to pay a rent sufficient to cover the expense of such erection. The accommodation for married soldiers requires great alteration. In the dwellings of the metropolitan poor, the strong arm of the law has been called in to stop the demoralizing practice of overcrowding their houses, and persons who allow several families to live promiscuously in the same apartment are now liable to fine and imprisonment. In the houses of the soldiers such arrangements are still permitted, which set all the rules of decency at defiance; and one room is totally insufficient for a married couple and five or six children. In cases where only one room is provided, a partition might, at any rate, be so arranged as not to interfere with the space; but in Portman-street and other places, this does not seem to have been thought of; and, bad as is this arrangement for the non-commissioned officers, it is worse as regards the privates, who are lodged two or more families in one small room, with no other separation than curtains drawn round the bed. Anything more demoralizing or destructive to the self-respect of men, women, and children, could not be well imagined,—nothing can stand against its effects. Fig. 5 shows a room occupied by three married soldiers, over the stables in the Albany-street Barracks.

A person born and reared in the London barracks, who has by industry acquired considerable skill as an artist, speaks bitterly respecting this crowding together. He has known three families, consisting of sixteen children, sleeping and living in one room. It seems extraordinary that such things should have been allowed; but, so far as we can learn, little trouble has been taken by the superior officers generally to examine the dwellings of the men. In London, most of the chief officers live away from the barracks, and it is to be feared that some of the medical men have, in many cases, not been sufficiently thoughtful; others, as we know, have long striven to obtain improvement, but without success. Even in punishing men, their health should be considered; and this can scarcely be the case when they are condemned to occupy a chamber such as the Black-hole of the cavalry barracks at Knightsbridge, which has no means of ventilation but the small grate shown in the sketch, fig. 6.

And here we would once more direct attention to the mass of information on the subject of barracks, the various suggestions, and the numerous plans, which were furnished by architects in the competition of 1856, and urge the immediate publication of a selection of them. In our volume for that year, very full particulars of many of the designs will be found, together with suggestions not, it is to be hoped, without value. The abomination of compelling sol-

diers to take their food and spend their spare time in the apartments in which a crowd of them have passed the night, should no longer be anywhere permitted. A greater amount of space should be given to each man, drainage should be made perfect, and the means of efficient ventilation afforded. Covered ambulatories are much wanted: some of the ancient barracks, as at Pompeii, had the parade-ground surrounded by a covered gallery, and here, too, there was a theatre for the amusement of the men in leisure time.

One-half of the hard drinking, says the late Sir Charles Napier, "springs from the discomfort, the despair caused by bad barracks;" and again,—"Losses by battle sink to nothing, compared with those inflicted by improperly constructed barracks and the *jamming* of soldiers,—no other word is sufficiently expressive."

We have heard more than one old soldier say, that it would not be well to destroy the hardihood of the men, by making them too comfortable in barracks, as that would cause them to bear badly the difficulties of a campaign. This is surely erroneous. Agricultural labourers are best able to carry out their work, and endure the changes of the weather, if they are properly fed and lodged in well drained and well-ventilated houses. In like manner the soldier will be more likely to be strengthened to battle with both the enemy and the pestilence, who has not had his constitution undermined by months of residence in overcrowded and unwholesome rooms, which serve the purposes of eating, and sleeping, and killing. The wholesale murder must no longer be permitted.

THE NEW ST. JAMES'S HALL.

THE St James's Hall is now nearly completed, and will be opened to the public in a few days. Besides the peculiar decorative character, as shown in the illustrations in our volume for 1856, and in the view of the interior exhibited by Mr. Owen Jones, in Suffolk-street, the building displays some novelties of construction deserving of attention, and which may require to be referred to hereafter, should they be found to belong to the commencement of an alteration in the current practice of building. We refer especially to the use of iron, less as an auxiliary than as a main element in the framework of a structure.

The value of the material, iron, for bridging over large spans, and for bearing heavy weights on small area of support, has become apparent; and the introduction of wrought iron has gone far to remove objections which were reasonably brought against girders of cast iron. But iron, in a building of the ordinary kind, as the primary material, does not seem to have been adopted,—its advantages for certain purposes, being what are considered, whilst also its limitations,—until the date of the erection of the Reading-room of the British Museum by Mr. Sydney Smirke. The Crystal Palace manner of building is here left out of the question; since, assuming that method to answer so far the purposes to which it has been applied, it cannot be considered to belong to the class of permanent and durable constructions, or to be capable of providing the requirements, especially as to equable temperature, in ordinary buildings. Of its inapplicability in such cases, the Brompton Museum supplies the best example. In this structure, as well as in the iron houses for emigrants, which are of precisely the same character, there is no substantial clothing to the interior, but a mere skin or shell—conducting, rather than shielding from, the extremes of heat and cold, and by no means fireproof. The ancient manner of building, with thick walls and vaulted ceilings, is that which, other things being equal, would remain the best suited both for hot and for cold climates. Now, however, the value of ground has to be considered; and in this country there is the further requirement of large area of openings for light. Thus the particular effects obtainable with the use of thick walls,—such as those of deep reveals,—cannot be in all cases procurable in a practice of building suited to the present conditions; other effects, however, may be, and greater scope of design generally, may, and indeed should be found, where structural resources are such as will at least allow of the attainment of the objects of convenience and use. Supposing our reasoning to be correct, the feeling of regret at a loss to architectural expression by diminished thickness of modern walls, results from misconception. If the thin wall will abundantly answer the structural purpose,—whether is it the right principle of practical building and architectural art, to make the wall thicker for mere effect, or is it to seek for the best effect that can be produced with economy? The latter principle might be conducive to the greatest progress in the art itself. Indeed, the course of the art, if progressive—whilst it need be attended by no depreciation of qualities or features in old works—must be precisely that which includes utilization of all new powers and demands. By the new elements and conditions it becomes the new art. The *rotonda* and dome at the British Museum have certainly reconciled the varied demands of stability, diminished area of support, and adequate enclosure, along with the realization of architectural effect. That example further shows how the thickness of an enclosure, constructed in a similar manner, may be turned to new advantage by being appropriated to air channels and like purposes.

In the St. James's Hall, the system of supporting the ribs of an arched roof on iron piers or standards, is resorted to. The brickwork of the wall, 3 feet thick, may be regarded as a mere filling-in between the standards; at least, it is so for the main portion of the entire height, or that which comprises the great hall. We may here remind our readers that the main building consists of two minor halls on the ground-floor, and the great hall over them. In attached buildings forming portions of the plan, are the various staircases and corridors, and rooms appropriated to objects in association with the purposes of the erection. The lower story is in communication with a *restaurant*, lately opened in the Quadrant, and one of the minor halls will be appropriated for banquets. The main entrances are from the Quadrant and Piccadilly, and there are minor entrances in George-court and Vine-street. A few words, hereinafter, as to the entrances generally, may be not out of place. The Piccadilly entrance has been obtained by the conversion of an ordinary house-frontage, and that, too, at some distance, measuring by length of corridor, from the door into the great hall on the south side. In all such points the circumstances of the ground have been unfavourable. The great hall has an arched recess at each end,—one for the orchestra, and the other for two tiers of galleries. Besides these last there are narrow side galleries, as shown in our view, referred to above.

In the construction of the main building, before spoken of, the arched ribs, the standards which support them, and the girders of the floor of the great hall, are each riveted to the other at the points of junction, so that the arrangement forms as much as possible one piece or framework. Each combination, so regarded, is further tied and braced from one standard to another, along the walls, and from girder to girder diagonally in the flooring; whilst the arched ribs are all united by an elaborate system of diagonal ties over the whole ceiling. The feet of the standards rest on iron plates, on large stone templates. They are strutted with raking pieces of angle iron. At this point of the bearing for the standards which carry the ribs, and for the girders, and of the attachment of the standards with the girders, a connection is made with the foundation of the walls by means of angle or T iron, down each face of the brickwork, with a cross tie, at intervals, through the latter. This continuation of the proper standards (which it should be understood, have the I form of section), if we understand rightly, is viewed in some degree as giving a *bearing* from the foundations: but, can that be the case, considering the omission of the web? The stone template and brickwork, or else the two pieces of T iron, we rather think must be regarded as the compressed and supporting members of the system, distinct from one another, in a case where there is unequal strength and unequal compressibility. Therefore, if the wall were not thick enough in this lower part, it would seem doubtful how far the T or angle iron could complete the requisite strength, or adequately substitute its own for it. Either the lower brickwork is not sufficient for the support of the weight of the standards proper, or the object or office of the angle-iron can be merely to *tie* the feet of the rafters down to the foundations. All the standards, ribs, and girders are of wrought and riveted iron; and there must be a very large quantity of the material used about the building and staircases. It is not correct, as stated in a recently-published notice, that the iron ribs of the ceiling intersect each other diagonally, "forming an arched lattice-work of wrought-iron girders;" in the decoration, however, the mouldings are so arranged. The galleries, at the sides and end, are borne by cantilevers, which are also of wrought-iron, and are riveted to the standards. There is no tie or counterfort to the iron ribs and the ceiling, other than what is supplied by the system itself; whilst in the wooden roof the ribs are made use of, so that the elaborate truss which would be required for a span of 60 feet is dispensed with.

Amongst the other noticeable features in the construction are the straight lintels to the windows, in place of arches, and formed of bricks set upright, four courses in height, and in cement, with a little hoop-iron occasionally worked in. The first brick at each end has a good bearing on the wall; and the lintels stand well; the strength being, we are told, as found by experiment, one-fourth less than that of arches with skew-backs The reveals are all 9 inches; and in the stone sills, the weathering is made to slope more than is usual. The Vine-street front of the building, we may mention, displays some decorative effect in brickwork. We should mention also, that the walls, on the inner face, are coated with pitch before the plastering is commenced; that in the floor of the hall, felt is laid below the floor-boards, in addition to the pugging; that the front of the orchestra is so contrived that it can be moved forward, so as to increase the space for musicians and singers when needed; and that there are many other provisions and contrivances deserving attention.

For ventilation, the main contrivance consists of shafts, in four rows, above the ceiling, covered below with ornamental pattern or fretwork, and terminating above in large metal caps. These have an unusual appearance seen from the street, arising from the weather covering which finishes them, and which it has been thought desirable to form in a sloping direction, or in a plane parallel to that of the roof covering. It is anticipated, and experiment with a model has seemed to justify the expectation, that each pair of shafts will act together, so that fresh air will be always descending by one, whilst impure and heated air will be ascending by the other.

The artificial lighting promises to be both novel and beautiful in effect. It will be managed by a number of small star-shaped *gaseliers*, suspended from the intersections of the main ribs of the ceiling.

Encumbered as the interior is at this time of writing, we can hardly form a conclusive opinion as to the result of the design. In general effect of main lines and colouring, and in many particulars, the result will doubtless be a successful one. It seemed to us, however, that the ornamentation of some of the panels was too minute. We refer particularly to the panels which have the pattern executed on paper, pasted up. Some of the prominent ornaments, also, in mere line and form, are hardly what might have been anticipated; and we doubt whether the banded patterns of the panels, or *severies* of the groining over the wall shafts, will not appear staring, and too large for the minute decoration above. These ideas, however, it is right that we should put forth with some diffidence. Mr. Owen Jones is justly entitled to be depended on.

We have less hesitation in objecting to some of the features of the Regent-street and Piccadilly entrances. In the former, the profile of the trusses is surely not at all what conveys the idea of support,—a principle which should never be departed from in an architectural member of the kind, on any ground whatever. Again, much of the foliage with which the trusses are covered, as well as other parts of the ornament, are beautiful; but, as in other details of ornamentation in this building, above referred to, we do not see the complete observance of principles which Mr. Jones himself has put into the clearest language. Where is the root or stem to all the foliage on the sides of the trusses? Not in the field of view, or in one and the same ideal position out of it. In the Piccadilly front the ornamental details, or some of them, have great beauty; but nothing could be more unfortunate than the general design, having regard to the public purpose. The front seems to be let in, and jammed between the houses; and whilst it has the same height as what it adjoins, it is difficult to get rid of the idea that it has even less.

It is still a question whether the requisite space for entrance and exit to this building has been provided since attention was drawn to its supposed defects by our correspondent, "Publicus." There may be some entrances and exits besides those in Piccadilly and the Quadrant, but we apprehend they may be required for special purposes. Practically the Piccadilly and Quadrant entrances appear to be the only ones to be considered. In the former case there are two doorways of about 3 feet 10 inches each; immediately within which, the corridor is narrowed by a projection on one side of it. The great

hall is thence reached by a long and circuitous route. From the Quadrant side, the entrance is hardly so direct as could have been desired, whilst to provide for the requisite number of visitors, by a staircase planned under disadvantages, the architect has been obliged to construct a long and very wide flight of steps, which even with a handrail next the wall, which will probably be added, might, on the occasion of any alarm, be the scene of terrible accidents. Number of staircases, and somewhat narrow flights, with frequent landings (of course no "winders"), are what are best adapted for places of public amusement; and under a proper system of building supervision, these, as well as an ample number of wide doorways, should be insisted on. The entrances into the body of the hall are five in number. Two of these are narrow, and might hardly be available for the public. Another is under the end gallery. Those which will be most used, on opposite sides of the hall, are, perhaps, about 5 feet 6 inches in the clear, each.

The provisions for entrance and exit in this building, may, however, contrast favourably with those of many of the theatres, where greater danger always exists. In Drury-lane Theatre, indeed, the staircases are good models, arranged on the principle we have referred to above. But, the public and the proprietors of places of amusement, require to be made to feel the necessity of very different arrangements from those which are at all usual. Dreadful calamities have occurred, verifying our long-repeated warnings and predictions to the word and the letter; and we must let no occasion, when warning is required, pass by without repeating it.

ON THE APPLICATION OF HYDRAULIC LIMES AND OTHER CEMENTITIOUS MATERIALS TO CONSTRUCTIVE PURPOSES.*

IN the very interesting paper lately read here by Mr. Bulnois, and in the course of the discussion which ensued upon it, some incidental remarks were made upon the use of concrete in foundations, which appear to merit more attention than they received at the time. Moreover, the evidence which was lately given before a coroner's jury, upon the occasion of an inquiry rendered necessary by the fall of a chimney, displayed so strange an amount of ignorance of the real philosophy of the use of concrete on the part of a practical builder, who seems to have been of average ability,—an ignorance, it is to be feared, shared by far too many of our so-called practical men—that I have ventured to bring the subject before you again, with the hope of being able to induce you, and the members of the profession generally, to examine it anew. In other countries this has been done very carefully and very successfully. Perhaps, therefore, a brief record of the recent investigations, and of the experience of Foreign and English engineers and architects, may suggest both what is still to be learnt and what to be avoided in the future researches to be made.

As it will be necessary in the following notice to allude to some controverted points of the chemical theory of limes and cements, perhaps I may be allowed briefly to state, even at the risk of going again over well-trodden ground, the opinions which are now generally held upon that theory, before describing the works recently executed.

The objects for which limes and cements are used are, as you must be aware, firstly, to connect together the small materials used in building; or, in other words, to produce artificially monoliths of the size and shape required in any particular case; and, secondly, to form preservative coatings upon the exposed surfaces of more perishable materials. It follows, therefore, that the qualities to be desired in a lime or cement are, that they should unite energetically with the bodies they are intended to join together; that they should set rapidly; and that they should attain within a very short period of time a sufficient degree of hardness to enable them to resist external causes of decay. In addition to these theoretical conditions must also be named the economical one; and it therefore should be considered that the previously cited advantages must be attained in conjunction with cheapness as to the first cost, and to the application of the materials. It is, in fact, this latter consideration of economy which has determined the preference of architects and builders for the cementitious materials with a lime base; for otherwise it may admit of question whether bitumen, silica, iron, or other bases might not yield cements of superior quality to those now generally employed.

* Read by Mr. G. R. Burnell, C.E. at the ordinary general meeting of the Royal Institute of British Architects, Feb. 22nd, already mentioned.

At a very early period in the history of architecture the use of bituminous and lime cements appears to have prevailed; though some of the boldest Pelasgic, and some of the most perfect Greek and Roman works were actually built without mortar of any kind. The Romans, however, used lime in most of their great works; and they were also well aware of the extraordinary property possessed by puzzuolano, of increasing the rapidity of setting, and the hardness, of the lime with which it was mixed. During the empire and the Middle Ages, the art of mortar and concrete making, as practised by the Romans, was preserved; and, indeed, although the use of concrete had been forgotten here, subsequently to the revival, it appears never to have been lost abroad. But even whilst thus practising upon a large scale the conversion of limestone into lime, with a view to the reconstitution of a solid homogeneous cement, the builders of former days paid little attention to the scientific principles involved in the operation. Smeaton, indeed, made some very shrewd guesses at the real facts of the case; and subsequently other chemists and engineers made advances towards the real scientific explanation of the phenomena attending the use of lime; but it was not until M. Vicat commenced his researches that any exact or philosophical views upon the subject were propounded, or that attention was called to the real nature of the difficulties to be overcome before arriving at any satisfactory explanation of the problem to be solved in the attempt to arrive at a correct theory of the philosophy of limes and cements.

It would be out of place, here, to dwell upon the history of the various descriptions of limes and cements now used, further than may be necessary to explain incidentally the circumstances under which they were introduced; and those of my hearers who may be anxious to study this branch of the investigation are therefore referred to Mr. Godwin's paper in the Transactions of the R.I.B.A.; to General Pasley's work; to M. Vicat's numerous publications; or to the more recent and more scientific researches of MM. Kuhlman, Fuchs, Signorilli, Uhagon, Minard, Chatoney, Rivot, &c. But it is important to observe that latterly somewhat different opinions to those which formerly prevailed, with respect to the circumstances under which limes and cements set, have been promulgated; and that the reasons upon which these new opinions are founded are sufficiently cogent to warrant a public examination of the methods of using those materials adopted especially in England, which would hardly have been prudent so long as the theory connected with them remained in its previous state. And as the practical questions involved in the consideration of the actual hardening of mortars are of vital importance to the architect, we ought carefully to examine the suggestions of competent observers, without yielding ourselves too implicitly to their or to any other authority. These suggestions may be most easily brought before your notice in a description of the works and the accidents which led to their being made.

Until within a very recent period, then, it was held that ordinary limestones when burnt in kilns parted with their water of crystallization and their carbonic acid, and were thus reduced to the state of an amorphous, spongy material, highly caustic, with a great avidity for water, and of small specific gravity. No change has yet taken place in this part of the theory of limes; nor have the principles enumerated by M. Vicat, with respect to the influences of the various substances in combination with the lime in the natural limestones, been materially shaken. The most competent authorities agree with M. Vicat in attributing the differences in the rapidity of setting of various ordinary limes to the presence, or the absence, of some of the different forms of silica, alumina, magnesia, or iron; or in some cases to a mixture of them all. The chemical combination of silica and alumina with lime in the stone appears to exercise the greatest influence upon the hardening of the resulting limes; or, in other words, the presence of the silicate of alumina in the limestone has been found to have so decided an influence upon the properties of the lime made from it, that the relative quantities of that salt ascertained to be in a stone have been universally admitted as forming a convenient scale for judging of its value as a source of lime. Perfectly pure carbonate of limestones, such as the upper and middle chalk, and most of the marbles, yield in fact a pure caustic lime, whose properties are that it swells when mixed with water sometimes to 2½ times its original volume, and that when in large masses it never hardens—within appreciable periods at least. The presence of a small portion of the silicate of lime in the limestone (as in the case of the chalk marl) produces the following effects:—First, that the caustic lime in slacking, or taking up water, does not swell to the same extent as pure caustic lime would do; secondly, that the resulting paste of lime, even when in large masses, will set within comparatively speaking short periods; and, thirdly, that it resists the solvent action of running water more satisfactorily than pure caustic lime would do: the latter indeed would be entirely removed if exposed to such a test for a sufficiently long period. A greater proportion of silicate of alumina increases the energy of the setting and hardening powers of the lime, as in the case of the blue lias limes; and finally, when the proportions of the silicate exceed a certain point, the limestones in which they exist yield a class of materials called "cements," which set without any marked increase of volume, and rapidly acquire a great degree of hardness, and are insoluble in water.

These various properties serve to classify the limes and cements; for the former are called *rich*, or *poor* according as they may or may not swell in slacking; and hydraulic or non-hydraulic, as they may or may not resist the solvent action of water. The cements are all poor, and most of them are permanently hydraulic.

It is found that so long as the limestone does not contain more than 10 per cent. of foreign matters, the lime it yields is rich, and non-hydraulic. When the foreign matters exceed 10 per cent. the lime becomes more and more poor; but if the foreign matters should consist of the silicate of alumina, or the silicate of magnesia, the hydraulicity increases in proportion to them. The scale proposed by M. Vicat for the classification of these materials is based upon these principles, and it is briefly as follows:—

The non-hydraulic, or rich limes, contain under 10 per cent. of foreign matters.

	Clay, per cent.	Lime, per cent.
Hydraulic limes contain.....	10	90
" "	20	80
" "	30	70
The extreme, or limit, is ...	34	66
Cements contain from	40	60
" " to	60	40
Puzzuolanos contain from ...	70	30
" " to	90	10

The class of materials last named is a natural volcanic product, and the silicate of alumina it contains is able, when the several materials are properly manipulated, to enter into combination with rich limes, and to communicate to them the hardening and hydraulic properties they themselves do not possess.

Until very recently it was held by most engineers and architects, by myself amongst others, that the solidification of mortars took place in consequence of the absorption of carbonic acid gas by the lime, during the process of crystallization; but it has been fairly objected to this theory that the quantity of carbonic acid gas contained in the atmosphere, which could be brought into contact with a large body of cement, would not suffice to saturate the latter. The generally received opinion on the subject now is, that limes harden, simply in consequence of the combination with water which takes place during the slacking, and that the rapidity of the setting and the permanence of the newly-formed hydrate of lime depends upon its being combined with some other salt. The pure hydrate of lime, in fact, is soluble: the hydrated silicate of lime is tolerably insoluble, but it forms slowly; whilst the hydrated double silicate of lime and alumina, or of lime and magnesia, is practically insoluble. The facts actually observed seem to confirm these views, and they certainly enable us to account for not only the different modes of setting observable in different limes, but also for some of the more gradual actions which take place in that material, and the effects reciprocally produced by the mixtures of various ingredients. In the case of the now generally used Portland cements, and in that of underburnt lime, some very curious phenomena may, however, be observed, which appear to indicate that the simple laws mentioned above do not comprehend all the conditions which may arise; so that the above theory itself must only be considered as a step towards the attainment of a complete one of a more general character. The phenomena to which I thus allude are connected with the obscure subject of the chemical actions which take place under the influence of high degrees of temperature, and we shall have occasion to refer to them in the sequel.

No sooner had M. Vicat published the researches and the experiments, on a large scale,

which had led to the formation of his original theories, than a great change came over the practice of architects and engineers in the very important portion of the arts of construction connected with foundations. It was then seen that by using the proper description of lime for the particular position to be dealt with, it was easy to obtain solid, homogeneous bodies of any size which might be desired, by the use merely of small and irregularly shaped materials; and that it was also possible to make, artificially, solid channels or reservoirs which should allow water to flow through or to be retained in them, without its communicating humidity to surrounding objects. Within a very few years from the promulgation of the discoveries of M. Vicat we accordingly find that the channel of the canal St. Martin was entirely formed of hydraulic lime concrete, in the parts where there was any danger from the infiltration of water into the cellars: the basins for the supply of water in the Rue Racine, and in some of the abattoirs, were also entirely constructed in the same material; and the French engineers universally adopted the system of backing the quay walls of their rivers, or the wing walls of lock chambers, with concrete. In erecting the suspension-bridge of Souillac (which must have been executed before 1828, because Vicat mentions it in his "Résumé sur les Mortiers et Céments Calcaires," published that year,—I think that it was built about 1824), M. Vicat himself used an artificial hydraulic lime, composed of a mixture of clay and of the pure carbonate of lime, for the purpose of forming the concrete used in the foundations of the piers. This work is interesting on several accounts; not only on account of its furnishing one of the earliest instances of the use of artificial hydraulic lime, but also on account of the foundations having been formed in the style described in Mr. Boulnois's paper, now universally adopted by foreign engineers in their bridges, and which Mr. Page was so disgracefully attacked for introducing here. At Souillac, the system adopted was that of driving an enclosure of sheet piling round the intended positions of the piers, of dredging out the interior of the space thus enclosed, and then of filling in with hydraulic concrete through a depth of not less than 16 feet 6 inches of water. It succeeded admirably, although only ordinary hydraulic lime was used in the preparation of the concrete; the term *ordinary* being applied in this instance in contra-distinction to any of the cements.

Between the years 1820 and 1840, the French engineers paid much attention to the preparation of artificial puzzuolanos from brick earth, and many experiments on a large scale were made to ascertain the qualities of the materials so obtained. M. M. Raffineau de Lille, Julien, Bruyère, Raucourt, Treussart, Minard, &c. studied this subject at the same time with M. Vicat, and the result of their investigations was that they considered the lightly burnt clays (which in their normal state are merely hydro silicates of alumina), would produce the same effect in expediting the hardening of limes as the natural puzzuolanos (which are merely silicates of lime affected by volcanic heat) were known to do. There was nothing in this theory to justify any *à priori* doubts of its correctness, and consequently the artificial puzzuolanos were used largely in river works, and in works exposed to the action of sea-water. For a time they resisted satisfactorily, but eventually I believe that all the artificial compounds of this description, immersed in sea-water, have sooner or later fallen to pieces, and it is now universally admitted by engineers that sea-water is able to destroy any mortars, exposed to its action, which are composed of ordinary limes mixed with separately burnt clays, whatever may have been the degree of heat they have undergone. The mortars made by the mixture of limes with the natural puzzuolanos, on the contrary, have resisted this cause of decay, just as the natural quick-setting cements, and the artificial Portland cement, when well made, have done; and the attempts to discover the explanation of the different actions of these various materials, under the same circumstances, have led to the actual state of our scientific knowledge on the subject of the most advisable manner of using them.

Amongst the most important works in which the avowed object of the engineers employed was to obtain, by the use of concrete, solid blocks of large volume, which should resist displacement by their mere weight, may be cited the Mole of Algiers, originally described by M. Poirel, in a "Mémoire sur les Travaux à la Mer," published in Paris in 1841. In this case it appears that the quay walls, and certain parts of the Mole, of Algiers, were formed by pouring concrete into caissons sunk in the positions selected, and lined with tarred cloth. This system M. Poirel states that he borrowed from the practice of the Italian engineers, who, when they have to repair a breach in a sea wall, cast down bags filled with concrete; and he adds that when the latter system is adopted, it is found that the small quantity of mortar which exudes from the bags binds the latter together in a very decided manner. But in addition to this use of concrete, M. Poirel employed it for the purpose of forming the jetty in deep water, by means of solid artificial blocks, cubing about 360 feet each, and weighing about 22 tons. These blocks were made upon land, and allowed to set in the atmosphere, the concrete being made by means of pug-mills, and rammed into wooden moulds. The French engineers, it is important to observe, are very particular in causing the lime which they use in concrete to be made up into mortar before it is brought into contact with the ballast: they look upon concrete, in fact, as neither more nor less than a rough species of rubble masonry, in which the proper composition of the mortar is the principal element of success—a principle sorely neglected by too many of our practical men. At Algiers, the concretes thus made were composed of two parts of broken stone to one part of mortar, which yielded, in place, two parts of concrete. But when the concrete was at once immersed in the cases, the mortar was composed of one part of rich lime, slacked and measured in the pasty state, to two parts of puzzuolano in fine powder: when it was used for the preparation of the artificial blocks, the mortar was composed of one part of lime, as before, to one of sand and one of puzzuolano. It was remarked that the puzzuolano which succeeded the best was the Roman puzzuolano, and that its action depended upon its being used in the state of a fine powder: in large grains, or in grains of the size of coarse sea sand, it was inert. The lime was obtained from the grey primary limestones of the district, in the works at first executed at Algiers; but of late years the Theil limestone, obtained from the subcretaceous series, has been substituted for the indigenous material. In placing the mortar in the cases, the concrete was let down in boxes, the bottoms of which opened on hinges: in filling the moulds of the air dried blocks, great pains were taken to ram the concrete into all the corners, and to consolidate it as much as possible before the setting commenced. These works have, I may add, succeeded remarkably well.

Another very novel and important application of concrete for constructive purposes was the formation of the new Graving Dock, No. 3, at Toulon, under the orders of M. Noel. In this case an enclosure of close piling on the sides and the land end, but open towards the harbour, was driven. It was about 400 ft. long by 100 ft. wide in the clear, and the ground within this enclosure was dredged out to a depth of about 45 ft. below the mean level of the sea. A solid bed of concrete was then inserted, under water, of the total thickness, on the average, of nearly 15 ft. between this enclosure, which had been previously lined, so as to prevent the washing away of the lime, by means of sail-cloth paid with tar After the whole surface of the excavation had thus been levelled to the required height, three large caissons, in eight compartments of the form it was intended to give the concrete hearting of the dock, were sunk in their definite positions, and loaded with pig iron, &c. so as to compress the upper surface of concrete. Intervals of from 14 to 16 ft. wide were left between these great cases; and a space of 16 ft. 6 in. was left on each side between the sheet piling and the outer wall. The concrete of the side, head and gate walls, was then inserted under water as before; leaving, in fact, nothing but a lining of masonry and the steps, or altars, of the Graving Dock itself, to be executed in ashlar masonry. The transverse spaces were filled in with concrete (which was afterwards removed), because it was feared that the infiltration would render necessary a great deal of pumping, and the engineer, therefore, thought it advisable to put in the bottom of the dock fractionally; but when a temporary earthen dam had been formed at the entrance, and the caissons were removed, it was found that the concrete had set so solidly that the anticipated danger from the infiltration proved to have been imaginary. Two small wells, indeed (10 ft. long by 3 ft. 8 in. wide), suffice to receive the waters which come through the gates, those which fall as rain, or those which filter through the bottom. The quantity of concrete in the bottom was 554,336 cubic feet, and in the sides it was 418,612 cubic feet.

M. Noel has given a very able description of the work he thus so successfully executed, and of the mechanical contrivances he adopted, in the 28th vol. 2nd series of the "Annales des Ponts and Chaussées for 1850;" to which I must refer you for these all-important practical details. It was indeed a marvellous work to insert a mass of concrete of these dimensions under so great a depth of sea-water; and its success must be attributed to the indomitable perseverance, and the ceaseless supervision of the engineer. M. Noel, before commencing the immersion of the concrete, tried a series of experiments on the various limes and other materials at his disposal; and he finally resolved to employ in his concrete a mixture of two parts of finely sifted Italian puzzuolano and one part of rich lime measured in the slacked paste. These ingredients were mingled in pug-mills, and subsequently mixed with broken stone, by being turned over with the shovel on a boarded floor, in the proportion of three parts of broken stone to two of mortar. M. Noel dwells a great deal on the precautions he adopted to get rid of the milk of lime which was forced out of the concrete when immersed; and perhaps the extent of this evil, as he describes it, may to some extent be explained by the great richness of the concrete he used. In the more recent works which M. Noel has executed, he has, I may observe, used the natural hydraulic limes of Theil, with very small proportions of puzzuolano; and, indeed, in many cases he has abandoned the use of this latter material entirely.

More recently even than the execution of this wonderful work, an equally successful application of concrete blocks in marine constructions has been made by M. Pascal, at the new port of Marseilles. In this case a large portion of the roads on the west of La Joliette, and the old harbour, has been enclosed, and a remarkably well planned set of basins and docks formed, by means of a large jetty, or enclosure wall, the hearting of which is formed of stones thrown down and allowed to assume a natural slope; but the top of the slope towards the sea, just at the foundation of the upright parapet and quay wall, is protected by means of huge blocks of concrete thrown down from above. These blocks are, each of them, about 353 cubic feet in volume, and weight about 22 tons, a volume and weight found to be sufficient to resist the disturbing action of the waves of the Mediterranean in this position. The composition of the blocks is as follows: the mortar is composed of three parts of the Theil lime, slacked by immersion, and measured in powder, to five parts of sand; or, when it was necessary to obtain a more rapid setting, one-third of the sand was replaced by a similar quantity of puzzuolano: this mortar was subsequently mixed with broken stone, in the proportions of two parts of stone to one of mortar. The concrete was rammed into a mould, and allowed to harden in the open air for the space of three months before being immersed: when it was essential to immerse the concrete immediately, as in the case of the foundations of the quay walls, the proportion of mortar was altered to two of mortar to three of stone. M. Pascal informed me that the artificial blocks had hitherto successfully resisted all causes of decay, and he most distinctly expressed his preference for good hydraulic lime over any mixtures of puzzuolano, or over any natural or artificial cements, provided sufficient time were allowed for its hardening.*

SANITARY IMPROVEMENT IN THE CITY OF ELY.

SOME of the Ely ratepayers having become rather luxurious and wasteful, in the use of water, since the new waterworks were erected and the new drainage and closets supplied; occasionally making demands upon their City reservoir to the extent of no less than fifty-seven gallons per individual per diem, instead of the twenty-five gallons calculated on in the outset as a sufficient supply; it became necessary to consider as to the propriety of procuring an additional engine to enable the local Board of Health to meet the increasing demand upon their resources. Willing as the ratepayers were, however, to take advantage of their improved sanitary position, they pricked up their ears on hearing of something like additional outlay being called for; and forthwith a memorial was got up and presented to the local Board, *complaining* that their engine had *failed* to do the work required of it and that it should on that account be necessary to obtain another to help it to do the work which it ought to do. The opportunity, moreover, was too good a one to be lost, and it was therefore seized, to advise the Board to overhaul their officers' salaries; and as their surveyor, Mr. Burns, had considerately enabled them to bring

* To be continued.

their waterworks and drainage to maturity without the necessity of paying an engineer to see to their proper construction, by gratuitously fulfilling the additional duties himself; and as these duties no longer required to be performed; a clause in the memorial seemed to imply that the Board ought now to repay such services by giving their surveyor notice to quit; especially as, the drainage expenses having been cut down to the lowest possible cost, by adopting the small pipe system, which did not provide outlay and capacity sufficient for the deposit of shavings, old rags, tobacco-boxes, brick-bats, and such extra trifles in the drains (which, though it appears perfectly successful in the performance of their general duties, required, in some half-a-dozen cases or so, to be re-opened and cleared of these obstructions); engineering errors were delicately and obscurely hinted at as a stimulant to the *à posteriori* kick which the ratepayers thus fully, though indirectly, authorised their official representatives to administer to certain of their small staff of officials.

This "memorial" has been met by a "report of committee" on the subject, which appears to have completely settled the case of the memorialists, but into the points of mere local interest we need not here enter. We have made these remarks simply as an introduction to a few points of more general interest in regard to the substantial benefit which the Ely ratepayers have derived, are deriving, and will yet derive from the late improvements, which cost some 11,000*l.* (instead of an estimated 9,000*l.* by the way—another subject of complaint, but) by comparison a mere trifle, when the hundreds of lives it has already literally saved are taken into consideration.

In the seven years previous to 1850 when the sanitary works were only beginning to operate on the health of the city, the number of deaths in an average population of some 8,000 was 1,324, or no less than 25·60 per cent. on the whole; whereas in the seven years since 1850, the number of deaths out of an increased population has been only 1,135, or only 19·30 per cent. of the whole, showing a clear average annual saving of life of 6·30 per 1,000. During the first seven years the annual rate of mortality *never descended* to the General Board of Health's *high* rate of 23 in 1,000, which authorises the compulsory application of the Health Act; whereas, during the last seven, it has never once *risen* to that bad eminence. On the whole, then, by the mere expenditure of ten or twelve thousand pounds, or, including private or house drainage, say even twenty or thirty thousand pounds, the lives of no less than *three hundred and fifty persons* out of a population of eight to nine thousand have been redeemed.

In conclusion we may remark that for the last two years the average rate of mortality in Ely has even been reduced so low as to 17·23 and 17·21 in the 1,000 (after a previous average, be it noted, of no less than 25·60); and that still further sanitary improvements of a pressing order yet remain to be done.

THE ROUND TOWERS OF IRELAND.

I HAVE read with pleasure the able and interesting essay by Mr. Gordon M. Hills, on the round towers of Ireland, laid before the Royal Institute of British Architects, and published in your columns of January 16th and 30th. I hail it as a valuable contribution to elucidate the architectural characteristics of these curious and anomalous structures. His analysis is clear, concise, and correct; his descriptions and measurements truthful: to the latter I can bear witness, as I have myself examined and measured most of those he has noticed.

So far I commend his paper, but am not prepared to admit the correctness of the conclusions at which he arrives, respecting their age and original uses. Mr. G. M. Hills evidently takes Dr. Petrie's work on this subject as his guide, and follows very closely that zealous and learned Irish archæologist in all his opinions and conclusions, particularly upon those branches of the subject of which Mr. G. M. Hills modestly professes his inability to form a positive judgment. Indeed, I fear that Mr. Hills has not examined the other side of the controversy, excepting what appears in Dr. Petrie's work: the pages of an opponent who quotes to refute, is not the exact place to study an author's opinions, for very obvious reasons. The question of the origin and uses of these towers has been narrowed to two theories, the Christian and pre-Chrisian. Dr. Petrie has ably and ingeniously advocated the first theory in his work, on the "Origin and Uses of the Round Towers of Ireland," an invaluable contribution to our knowledge of the early architecture of Ireland, but in my opinion a failure as regards the theory he supports. Mr. Hills seems to think that the high standing the doctor has deservedly attained in the archæological world, is quite a sufficient warrant for his acceptance of the statements and opinions put forward; but this I hold is not sound discretion. If we are to be carried away by the *prestige* of names, by far the greatest amount of Irish antiquarian learning and research has been on the other side. The Christian theory found advocates in Lynch, Ledwick, and Molyneux, who advocated their Danish origin (the Danes being Pagans); Harris, Milner, Smith, Sir R. C. Hoare, Bell, Wilkinson, and Petrie. Of these, Milner and Hoare had no knowledge of Irish antiquities. Bell and Wilkinson's treatises are purely descriptive.

On the side of Pagan antiquity are Vallancey, author of the "Rebus Collectanæ Hibernica;" Dr. Lanigan, author of the "Ecclesiastical History of Ireland;" Dr. O'Connor, the learned librarian of Stowe, and author of the "Hibernicarum Scriptores Veteres;" Sir William Betham, author of the "Etruria Celtica," the "Gael and Cimbri;" Beaufort, Dalton, O'Brien, Moore, and Windele—all Irishmen, deeply versed in the literature, language, and monumental antiquities of the country. To these I could add the names of many who have made the Irish language and antiquities the study of their lives, but who have not come before the public as authors.

The earnest inquirer, however, will not be carried away by the mere pretensions of individual learning, however well founded, but will patiently investigate all sides of the subject, examine the buildings themselves in all their details and analogies, compare the peculiarities of their construction, their architectural features with similar erections in other countries. He must study the language, religion, and customs of the people amongst whom they are found, and the traditions connected with them, the known history of the people, their origin and migration. Such a mode of investigation I say is requisite, in order to form opinions upon the subject before us, and is obviously the only mode in the absence of all *historical evidence* as to their origin and uses, and I fearlessly assert that up to the present we have no such evidence whatsoever as to the erection of a single *round tower* in Ireland.

The whole structure of Dr. Petrie's Christian theory rests on the bare assumption that the appellation, "clochteach," or "cloichteach," used in a certain number of places in the Irish Annals, signifies a round tower belfry. We shall see with what probability. The term is compounded of two words,—*cloch*, a stone; and *teach*, *tige*, or *tig*, a house. The word "cloch" is thus given in O'Reilly's Irish dictionary:—"Cloch, a stone; clochaire, a mason; cloich-iuil, aloadstone; cloichran, a stonechatter;" and so on. The term, then, cloichteach, would read, stone house, to distinguish a building erected of stone from those in general use, formed of wattles, logs, or built of sods,—as were not only the private houses and cabins of the ancient Irish, but also a great many churches and oratories in the early ages of Christianity, not only in Ireland, but in England. And that buildings, constructed of stone, whether churches or otherwise, should be so distinguished from those composed of other materials, is extremely probable and natural: indeed, in our native Annals they are so distinguished. Thus, the term "damliag," applied to a church, is of exactly the same meaning as cloichteach, from "daimh, a house, a church;" "liag, a stone." The compound name is given in O'Reilly's Irish dictionary, "daimhlaig, a church of stone." A similar mode of expression is the term "cloch-ancoire," the stone of the anchorite or recluse, to designate his cell or oratory: thus, also, the Castle of Cloch-Phillip, the Stone of Phillip, a mediæval building in the county of Cork.

The native annalists use a similar mode of expression, to designate wooden churches and oratories; the compound term, "dairtheach," "duirthech," &c. from dair, an oak; streach, a house, the oak house, or house of wood (see Dr. Petrie's work, page 342). So that we have here terms profusely used by our native historians, to designate religious structures by the materials of which they were composed; and we must therefore, in common with these other terms, take "clochtheach" to mean stone house, and not a round tower belfry, as it expresses neither form, height, nor use.

That there were belfries at a comparatively early period in Ireland, I will not by any means dispute; and that they were sometimes called "clogtheach," is probable enough; and that the ancient round towers were turned into belfries on the introduction of church bells into Ireland, is more than likely; but I do dispute that there were belfries, that is, buildings specially erected for hanging church bells in, before the tenth century.

Indeed, the first notice that Dr. Petrie has been able to produce, of what he designates a round-tower belfry, is in the middle of the tenth century, and is as follows, from Dr. O'Donovan's translation of the "Annals of the Four Masters:"*

"A.D. 948. The Cloichtech of Slane was burned by the foriegners, with its full of relics and distinguished persons," &c.

The doctor maintains that this was a round tower. What is there in the term to designate its circular form—its tower-like elevation? But the circumstance itself is very unlikely to have happened to, or in, a round tower. In the first place, there is not, and never was, in memory or tradition, a round tower at Slane; and secondly, how could a round tower be burned? It is a circular edifice of stone, massive wall, stone roofed, with a small doorway at a considerable elevation from the ground, and a few small apertures for windows at a much greater height. What was to burn? "The wooden floors and doors," suggests the doctor. But what evidence have we that the floors, *if any*, were of wood? None. We have not a scintilla of evidence that they were of any material but stone, if we can take as evidence the fact, that the only original remaining floors are of stone. Four of these floors remain, as stated by Mr. G. M. Hills: three are stone-arched floors, the fourth formed of slabs of slate. An interesting example of one of these arched floors is given in Mr. Wilkinson's "Practical Geology and Ancient Architecture of Ireland." The ancient Irish, who erected great stone forts, with stone lintelled gates and passages; who constructed underground chambers domed with stone, and intricate passages lintelled with the same material; who on the southern and western coasts constructed numerous buildings entirely of stone to the apex of the roof, on plans embracing the rectangle, square, circle, ellipsis, quadrant, and the form of the human eye; and who subsequently built their churches with stone roofs: such a people, I say, were not likely to put wooden floors in their stone-walled and stone-roofed towers. Indeed, it is certain that many of the towers had no floors, as we have instances of towers without floors, string courses, offsets, joist-holes, or any provision for floors.

Under such circumstances we must reduce the conflagration to the door, which would not make enough of a blaze, to justify the annalist in the strength of his language. But if we consider the historian to mean the stone house, or Church of Slane, all difficulty vanishes. The sacred edifice has been in all ages, and among all people, Pagans as well as Christians, the refuge in times of public calamity and danger; thither they fled to be under the special protection of the Deity. The Church of Slane alone could contain the numbers of persons stated to have taken refuge. The roof, altars, doors, fittings, &c. offered alone sufficient food for the flames of a conflagration, attended with such results.

The next notice is at A.D. 995, as follows:—"A.D. 995—Ardmacha (Armagh) was burned by lightning, both houses, churches, and cloictheaca, and its Fidh-neimhedh [sacred wood], with all destruction." That the word here does not refer to a round tower, is evident to the simplest understanding, for how could a hollow stone pillar, stone to the pinnacle, be burned by lightning? Yet upon such absurdities has Dr. Petrie erected his Christian theory. The appellation must refer to some other class of religious structure, connected with the large ecclesiastical establishment at Armagh. But supposing that the word does mean a bell-house, or belfry, it does not imply that it was a round tower; it is very probable that wooden belfries were used here, as on the Continent and in England, at that and much later periods. It is absurd to suppose that where we had churches of wood we should erect belfries of stone 120 feet high, and almost as durable as the pyramids. There is no round tower at present at Armagh, nor has there been in any living memory. At A D. 1020 of the same "Annals," we have the burning of the Cloichtheach of Armagh again, with its bells. It is utterly absurd to suppose that these repetitions of conflagrations refer to any but structures of a fragile and inflammable construction. The above passage records, I believe, the first mention of church-bells in Ireland. Bells were in use previously, but they were hand-bells, used in church services as among the Egyptians, Romans, and Hindoos. There has been a great deal of archæo-

* Dr. O'Donovan advocates the Christian theory of the towers, and supports his friend Dr. Petrie's views strenuously. he always translates "cloicteach" belfry.

logical nonsense written about these bells, and a great many idle and superstitious legends recorded of them, and gravely retailed by a certain class of modern antiquaries. I believe that, about this period, bells to call persons to public worship came into use, though still confined to churches of eminence. As I have before stated, it is only reasonable to infer that the ancient towers were used as belfries (as indeed some are to this day) in those places where they existed, and that in other places appropriate bell-turrets, or bellcots, were erected.

It is probable many of our earliest belfries were of wood; ancient ones of stone are also in existence, some of considerable antiquity. A triangular-headed bellcot is found over the west gable of the ancient church of Roscrea, an example of early Romanesque. A similar one exists over the west gable of the very ancient church of Monaincha. A large triple bellcot, each of the apertures having a triangular head, after the manner of round-tower windows, is found at Donoughmore, in close proximity to the round tower, which has windows of the same form as the apertures of the bellcot. The example at Roscrea is also within a few yards of the round tower. In a great many instances, belfries are found on churches of the thirteenth, fourteenth, and fifteenth centuries, in close proximity to round towers; an evident proof that the towers were not used as belfries, or considered suitable for that purpose. Square belfries of a remote antiquity are also found in Ireland. On Innisclothran Island, in Lough Ree, is one as old as the tenth or eleventh century. A very ancient one is over the west gable of the little church of Cloghereen, near Killarney. Cormac's chapel, at Cashel, was commenced about the year 1100; it was consecrated in A.D. 1134. It is a small building, consisting of a nave and chancel, and has two square towers at the junctions of the nave and chancel, showing evidently that the magnificent round tower standing within twenty yards, and looking down majestically upon these things of yesterday, was not considered suitable for a belfry, or held in any particular veneration.

The remaining notices referring to "cloichteach," in the "Annals," are eleven, being altogether fourteen, commencing at the year 948, and extending to 1238. Of the above number of places thus noticed, round towers exist but at five. It is also remarkable that six notices record the burning of "cloichteach," which I have shown to be impossible to a round tower. Two of these notices occur, one in the middle, and the other at the close of the tenth century; the rest occur in the eleventh and twelfth centuries, at a period when it is well known extensive monasteries and large abbey churches were erected, such as Boyle, Jerpoint, Dunbrody, Ballintubber, Cong, Corcumroe, and others. These edifices are planned on the same principles as the continental churches of the same period, and of dimensions not far short, consisting of nave, aisles, transepts, chancel, and numerous chapels, with massive square belfries over the intersection of the nave, transepts, and chancel.

The Irish language gives us unmistakeable and indisputable terms both for bells and belfries. If we look into O'Reilly's Irish dictionary, we find:—Clog, a bell, a clock; clogachd, a belfry; clogas, a belfry; cloigtheach, a steeple, a belfry. The derivation of these terms from "clog," a bell, is quite obvious. If the Irish annalists, in the passages quoted by Dr. Petrie, and referred to by Mr. G. M. Hills, intended to have expressed belfry, they would have used some of the above terms, and not the word "cloictheach," which, as I have shown before, means stone house. And what do I find? That the only notice of an authenticated belfry, and which is now in existence, occurs in the "Annals of the Four Masters," at A.D. 1584, where the square belfry of the abbey church of Ciunche, now Quin, in the county of Clare, is called a "clogas." Dr. O'Donovan, the translator, in a note to the passage, says, "*The cloccas of Cuinnche, i.e.* the belfry of Quin. The word 'clogas' is *usually* applied to a round-tower belfry, detached from the church; but it is here evidently applied to the square tower of the great abbey of Quin, still remaining." How can the translator say "*usually* applied," when in the entire "Annals" there is not a single instance of the use of the term, except in this one instance, where it is used to designate a belfry, which happens to be a square one, of the fourteenth century?

According to Dr. Petrie, the first notice we have of the erection of a belfry, is in the year 965. The passage he quotes from the "Chronicon Scotorum," has reference to the erection of a "claigteac," at Tomgraney: the word has evidently an affinity to, and is derived from "clog," a bell; but whether the belfry, or bell-house, was a round or a square tower, or whether it was a tower at all, is very problematical. The only tower at present in existence at Tomgraney, is a massive square one adjoining the church, but there formerly existed an ancient bellcot on the west gable of this, truly primitive building. Mr. G. M. Hills repeats Dr. Petrie's assertion, that a tower was in existence at Tomgraney forty years ago.

Now, I visited Tomgraney in the year 1852, accompanied by that eminent and laborious antiquary, Mr. John Windele, of Cork. We made the strictest inquiry respecting this fabled tower; indeed, to satisfy ourselves on this point, was one of the principal objects of our visit: we procured the following evidence:—Peter Byrne, wood-ranger, aged over sixty years, "remembers the ould church from his infancy, certainly over fifty years. Never saw a steeple, or any portion of a steeple here; never saw any building like the round tower on Holy Island."*

Simon Hickey, an intelligent old man, and a Protestant, frequenting Tomgraney Church all his lifetime, stated, "He was eighty-six years old, and never saw a belfry, round or square; never saw a building like the tower on Holy Island at Tuam (Tomgraney); it could not have been there unknown to him. Never heard the old people (his parents) say there was. He remembers a belfry on the west gable of the church, but it has been down many years; and there was no bell in it in his time."

That the word "cloichteach" does not *always* mean a *round* tower, is, indeed, admitted by Dr. Petrie himself; for in quoting the erection of one at Annadown, A.D. 1238, he says,—"As there is no belfry now remaining at Annadown, it may be uncertain whether this 'cloigtheach' was of the usual ancient round form, or of the quadrangular shape, and connected with the church, as generally adopted in Ireland, at the period of the Anglo-Norman invasion." If, then, there is any uncertainty as to the meaning of the term in this case, every other is open to the same objection; and I certainly, for one, am not prepared to accept a theory based upon so flimsy a foundation.

The characteristics of the belfry towers erected to parochial and monastic churches in Ireland, in the thirteenth century, are too well known to every student of Irish Mediæval architecture, to admit the probability of a *round tower belfry*, being erected at an era when church architecture received such an impetus, as it did at that period from the influx of the Anglo-Saxon invaders, and from the more immediate connection of the Irish Church with that of Rome. From the year 1200 to 1260, were erected the following extensive monastic houses:—Drogheda, Newtown, Lorha, Kilkenny, Youghal, Trim, Ballybeg, Buttevant, Athenry, Kildare. These buildings were erected in the first Pointed style; their towers were lofty, square, battlemented structures, poised upon arches, between the nave and chancel. The churches were from 240 to 200 feet in length, consisting of a nave with, and often without aisles, a chancel, generally but one transept, with side chapels. The conventual buildings consisted of the usual domestic offices, surrounding a cloister-court, and were very extensive, as the ample ruins of many still existing testify.

Before I conclude I would wish to remark one singular fact. It may appear to the English reader that the Irish had no word to express a lofty erection but such is not the case. The word "tuir, tor," signifies a tower; and it is very singular that, if the native annalists alluded to the round towers in the passages quoted, they did not use the above word in connection with "clog," a bell, to designate them. The word "tur" is frequently used in the "Annals of the Four Masters:" thus at A. M. 3066 mention is made of the demolition of the tuir (tower) of Conainn; and again, at A.D. 991, mention is made of a chieftain, called Taidhg of the Tuir. Dr. O'Donovan translates the word, in every case, tower.

Much more might be said upon this subject, but I dare say the readers of the *Builder* will exclaim "enough." The argument is a dry one, and I would not have ventured on it in the pages of the *Builder* had not Mr. Hills laid it down, that all the archæological learning of Ireland had decided that "cloichteach," when used by the native historians, signified "a round tower belfry."

RICHARD ROLT BRASH.

* Inniscaltra, in Lough Derg, on which stands a fine round tower.

A PLEA FOR THE BEAUTIFUL IN ART.

IT may appear presumptuous on the part of your humble servant, who is, according to Mr. Francis Horner's showing, enveloped in an atmosphere unfavourable to the development or growth of high art, to attempt to offer any remarks on a subject that has employed the thoughts and lives of the greatest men of their generations. Yet, with the utmost diffidence in my own judgment, and all due deference for the opinion of Mr. Horner, I humbly submit that good may come, ay, has already come, out of Nazareth. It is true that the minds and energies of the people of the North American continent have hitherto, in a great measure, been directed to works of a utilitarian character; still some bright rays from the heavenly sphere of beauty have penetrated the enveloping atmosphere, and filled the souls of not a few, with ardent longings for the realization of their ideal of the beautiful in art. Mr. Horner may have heard of the names of Powers and Crawford, natives of this continent, who have attained to honourable fame as sculptors; and of West, who became distinguished as a painter. It is true, their genius was, in good part, developed in the schools of Europe; still there is sufficient evidence left to show that the atmosphere of this continent is not wholly destructive of high artistic genius. There are agencies now at work on this continent which, at no very distant day, will produce artists that will astonish the world.

My principal object in addressing you on the present occasion is not to defend the artistic genius of the people of this continent, but to make a few observations upon the statements contained in Mr. Horner's very able communication, published in the *Builder*, of the 9th January, irrespective of the practices of Raffaellites, or pre-Raffaellites. Mr. Horner asks,—"Is it not the case that we must form our estimate of an artist rather by his power of perception of the beautiful, than from his power of hand, however great?" I answer that, judging him as an artist, we can form our estimate only by his power of hand. Suppose a man asserts, by word of mouth, that he conceives a beautiful statue to be enveloped in a rough block of Carrara marble just taken from the quarry, what means have we of judging of the truth or untruth of the assertion? None whatever. If the statue be produced by power of hand, and possess all the qualities of the beautiful, we have then the visible evidence of the truth of the assertion, but not till then.

Mr. Horner again remarks:—"The fire of genius may often be too impatient to spend time over minute finish; but if the inspiration of beauty be there, the mind will be more influenced by a hasty production from such a hand than it ever can be by any elaborate manipulation, or practical knowledge possessing no corresponding mental vigour." The truth of this statement, so far as it goes, I do not call in question, but would respectfully observe that the case so submitted to the judgment of your readers does not involve the real question at issue. The real question at issue seems to me to be this—Whether, all things else being equal, a work of art, possessing beautiful lineaments, but wanting in elaborate finish, is more worthy of admiration, and more capable of exciting pleasurable emotions in the mind, than a work possessing the same beautiful lineaments, and in addition evincing elaborate finish. I have no hesitation in affirming, that the great majority of artists, and the great bulk of mankind in general, would award the prize to the latter. I am aware that the sympathetic feelings of some persons are more readily excited by a defective than a perfect work of art. You may have heard the story of a lady whose profoundest emotions were excited by seeing a wheelbarrow with only one leg, the maker of which became too impatient to spend time over minute finish, *i. e.* to finish the other leg. But surely no person would, all things else being equal, more highly estimate a one-legged than a two-legged wheelbarrow. A similar decision with respect to all works of art, whether high or low, under analogous circumstances, will, I apprehend, be invariably arrived at. When persons are strongly affected by a work of art deficient in elaborate finish, they are affected upon the same principle as persons are affected by beauty in distress,—not so much by admiration for the object as a work of art, but by a species of pity for the distressed condition in which it is left,—its want of finish; for, as Edmund Burke truly says, "beauty in distress is the most affecting beauty."

We hear a great deal now-a-days about the fire of genius, concerning which very many erroneous ideas are entertained, many persons holding the

doctrine that, in order to attain to eminence in any department of art, a man must be born an artist. If we carefully consult the lives of great men, we shall generally find that it was chiefly by diligence and steady perseverance they attained to greatness. "I know of no such thing as genius," says Hogarth to Gilbert Cooper: "genius is nothing but diligence." "Genius," says Dr Johnson, "is like fire in a flint, only to be produced by collision with a proper subject: it is the business of every man to try whether his faculties may not happily co-operate with his desires; and since they whose proficiency he admires knew their own force only by the event, he needs but engage in the same undertaking with equal spirit, and may reasonably hope for equal success." Longfellow, with the true inspiration of a poet, beautifully observes:—

> "The lives of great men all remind us,
> We can make our lives sublime;
> And, departing, leave behind us
> Foot-prints on the sands of time."

I am sorry I cannot admire Mr. Horner's critical acumen equally with his abilities as a writer. He says, "Human nature is the same in all ages, and is ever affected by the same sympathies." No other proof is required to refute this statement beyond what is contained in the quotation furnished by Mr. Horner himself. "For indeed a change was coming upon the world, the meaning and direction of which even still is hid from us,—a change from era to era. The paths trodden by the footsteps of ages were broken up: old things were passing away; and the faith and the life of ten centuries were dissolving like a dream. Chivalry was dying. The abbey and the castle were soon together to crumble into ruins; and all the forms, desires, beliefs, convictions of the old world were passing away never to return." Now, if it be true, as stated here, that all the forms, desires, beliefs, convictions, &c. passed away never to return, I confess to be unable to understand how human nature is ever affected by the same sympathies; for, when all these things mentioned, which undoubtedly constituted the principal ingredients of human sympathies during the ten centuries referred to, passed away never to return, surely human nature since that time must have been affected by sympathies totally different from those that passed away.

Whilst I fully concur with Mr. Horner respecting the great importance to artists of a due appreciation of high sentiment, I cannot but think at the same time that the expression of the most exalted sentiment by any work of art is quite compatible with the most elaborate finish of appropriate detail; and, instead of such detail obscuring the general sentiment sought to be conveyed, or lessening its effect on the imagination, I am persuaded much expressive force is thereby added to it, and must necessarily affect the imagination in a proportionate degree. Appropriate detail in a work of art stands in the same relation to the general sentiment sought to be conveyed as suitable action to the speech of an orator.

E. NUGENT,
Member of the Upper Canada Board of Arts.

ARCHITECTURAL ASSOCIATION.

ON Friday, March 5th, a meeting was held at Lyon's-inn Hall, Strand, Mr. A. Cates in the chair.

The paper read was by Mr. J. W. Penfold, on "Speculation and Competition; their Effects on the Buildings of the present Day." This we print *in extenso*, and commend it to the attention of our readers.

In the discussion that followed, the chairman observed that the only remedial means for the evils described by Mr. Penfold were to bring them prominently before the notice of the architectural world and the public. Great credit, he conceived, was due to the Architectural Association, for the steps it had taken to improve the *status* of the profession in these respects, and in matters of examination and competition. It was highly desirable that the public and committees should be induced to aid in these reforms; and, unfortunately for the profession of late years, a number of individuals had got into it, who, having utterly failed as speculative builders, professed themselves to be architects, while in reality they threw discredit on the body. Some steps ought to be taken by the Institute, the leading recognised architectural body in the kingdom, to establish a better professional *status*, and then the public service would be better performed. It would be of advantage, probably, to open a communication on the matter with the Institute, who, he thought, should now report how the system of candidateship for district surveyorships worked.

Mr. Capes thought speculative building and the present system of competition formed one of the great curses of the profession, and tended to lower its *status*. Competition, instead of creating a generous emulation, and raising the standard of architectural art, had quite a contrary effect, and there were men in the present day who were unscrupulous alike both as to the means of producing works of art, and in carrying them out. Some code of regulations among both architects and builders was much required. He condemned the motto system, and hoped it would be entirely abolished.

Mr. Espinett trusted that any new code would be of a protective character to the profession.

Mr. Bunker considered that the present evils originated altogether in that want of principle which characterised the history of the British Bank and Branksea Castle. Tenders, in which there was 50 and 60 per cent. difference, could not but have their origin in simple dishonesty. The builders were not always to blame, and he had often heard them say that the employing architect made all the difference. He trusted this agitation would be carried on, and that it would be supported by the Institute.

Mr. Mallandaine could not help thinking that many of the evils complained of originated with the architects themselves, who gave but a small scale of remuneration to properly qualified persons, while they took high premiums for pupils to do work for which they were totally unqualified. He thought the Institute should give licenses to members of the profession to receive pupils, who, at the end of their articles, should pass through an examination, and, in the event of their not doing so successfully, the architect should be made to refund a portion of the premium, and the licenses should be revoked.

Mr. Herring was of opinion that, if the numerous charlatans in the profession were kept out of it, competitions would be fairly conducted. There were men who obtained business by giving dinners and subscriptions to charities, and employed assistants to do their work.

Mr. Webber thought blame was to be attributed to architects themselves from the indiscriminate way in which they rushed into competitions, however small the premium. The motto system was a farce, for a man's style and handwriting were known, and the name had better be given at once. It would be better to limit the number in competitions, and then there would be some guarantee that no unfair advantage would be taken. He looked earnestly forward for the forthcoming code of the Association intended to be remedial of these evils.

A member, adverting to the question of premiums and pupils, said he knew of a case in which there were fourteen pupils in the office and two clerks. The architect did not consider himself bound to teach them, but gave them the run of the office.

Mr. Benwell considered that one remedy for bad building would be a perfect Building Act, so remedying the evils that now existed in connection with speculative building.

After some further discussion, the meeting adjourned to March 19, after a vote of thanks to Mr. Penfold for his paper.

ON SPECULATION AND COMPETITION: THEIR EFFECTS ON THE BUILDINGS OF THE PRESENT DAY.*

DURING the few months that have passed since the title of my paper was placed on the programme, so much has taken place practically to illustrate the disastrous effects of what is perhaps one of the most crying evils of the day, and the leading journals have contained so many powerful and ably written articles on the social and moral evils of undue speculation, as displayed in the circumstances of the late commercial crisis, that there seems but little left unsaid on the general subject, and it would seem almost presumptuous in me to attempt any further remarks on what has been already so ably treated: still when we reflect that the evils of that grasping and gambling spirit which has been so much denounced, not only affect ourselves in their immediate action on the productions of our art, and those of the trades with which we are more immediately connected and acquainted, but that they entail a loss and an injury, and that a continually increasing one on our successors,—I trust that the few observations I shall venture to make will not be considered out of place; and if I succeed in bringing nothing before you but that on which you have often thought, I trust the importance of the subject, and the desire of keeping it constantly before you, may be an excuse for thus occupying your time. And here I must ask you to bear in mind that I am about to treat on things as they are, and not altogether on things as they ought to be; and, if I may be severe on a system or a class, I do not wish it to be understood I intend a wholesale condemnation, as there are, of course, many honourable exceptions, in which very much even of credit is due for what has been done under circumstances which prove mere stumbling-blocks in the path of everything true and honest; for, while I believe that a spirit of undue speculation and competition leads to the most disastrous results, I am none the less convinced that a generous encouragement of speculation and a spirit of honourable competition are not only conducive to the advantage of our employers, and to the common weal, but are essentially necessary to the vitality of our profession and its commercial auxiliaries, and the transmission of that good name which we should all be anxious to obtain, to those future generations for whom we must bear in mind we are also working, and who will be in the best position to judge of our merits or defects.

There is a passage in Ruskin's "Lamp of Memory," which expresses in such forcible language somewhat of my own feelings, that, with your permission, I will quote it. He says,—"I cannot but think it an evil sign of a people when their houses are built to last one generation only; * * * and I look upon those pitiful concretions of lime and clay which spring up in mildewed forwardness out of the kneaded fields about our capital, upon those thin tottering foundationless shells of splintered wood and imitated stone, upon those gloomy rows of formalized minuteness alike, without difference and without fellowship, as solitary as similar, not merely with the careless disgust of an offended eye, not merely with sorrow for a desecrated landscape, but with a painful foreboding that the roots of our national greatness must be deeply cankered when they are thus loosely struck on their native ground; * * * when men build in the hope of leaving the places they build, and live in the hope of forgetting the years they have lived, when the comfort, the peace, and the religion of home have ceased to be felt, and the crowded tenements of a struggling and restless population differ only from the tents of the Arab or the gipsy by their less healthy openness to the air of heaven and less happy choice of their spot of earth, by their sacrifice of liberty without the gain of rest, and of stability without the luxury of change. This is no slight, no consequenceless evil: it is ominous, infectious, and fecund of other fault and misfortune." I am sure that thoughts like these must often arise in the minds of a reflecting man, even an uninitiated one, during a walk in almost any of our metropolitan suburbs, as he watches row after row of carcases spring up almost back to back with mushroom rapidity; while the professional man will not fail to notice, amid all the hurry with what care the bricks are uncarted, and generally stacked for use; and notwithstanding this, that the stack produces an inordinate proportion of bats; and also, that, however much of clay there may be in "these pitiful concretions," the lime is exceedingly homœopathic in quantity, being principally what may chance to be available in the siftings of some plaster or mortar rubbish of which the builder has become the fortunate possessor. Beyond "desecrating the landscape" so long as these erections remain carcases (and long do they often so remain), they do little harm to the community at large, and rather hold themselves up "in terrorem" to intending speculators; but it is when, by the aid of a few Corinthian capitals and vases from the New-road, and a composition expressly devised as a cloak for a multitude of sins, and which does duty in these cases as Roman cement, these carcases become transformed into Albert terraces and Victoria crescents, that the evil result is appreciated by the public, and the truth of the maxim of our old poet Quarles, that—

> "The masterpiece of knowledge is to know
> But what is good from what is good in show,"

is forcibly thrust on the mind of the helpless occupant, who, if he has been so additionally unfortunate as to purchase, is soon made aware, by the settling brickwork, the shrinking joinery, and the peeling cement, that he has most unwittingly included himself with the house in the bargain of sale.

Now, although the country, as distinguished from the metropolis and its suburbs, is far from being immaculate in building matters (in fact, I have now in my eye several instances of two half-brick party-walls), still, speaking generally, there is not so much absolute scamping; and I believe the reason of this to be, that each man builds chiefly on his own freehold,—building leases are almost unknown,—and the class of men we recognise here as speculative builders have no existence. And it is to the introduction of these men, nurtured by a system which almost offers a premium to rascality, and an incentive to bad workmanship, that the greater proportion of the evils to which I have referred are traceable; and I propose, therefore, to give a hasty outline of the principal causes, which I believe force such men into notice to the exclusion of those of capital and character, to whom we should look for better things.

As it is in the practical working out of the details of a building speculation that the state of things of which we complain arises, it may tend to elucidate my remarks if I give a slight sketch of the common history of a London Building Estate. We will suppose, therefore, an individual, whom for the sake of identification we will call Brown, a timber merchant, or brickmaker, perhaps a lawyer, sometimes an architect, or surveyor, perceives that buildings are gradually, but inevitably approaching some eligible fields the property of a Mr. Jones. Brown being fully alive to every opportunity of pushing business, and employing any spare capital he may possess, having negotiated for a lease for ninety-nine years, at so much per acre (equivalent perhaps to 2*l.* each on the houses proposed to be built), straightway proceeds to lay out Jones's fields as an "Eligible Building Estate;" procures a slashing bird's-eye view to be made *secundum artem*, showy churches, Gothic villas, &c. *ad lib.*; persuades Jones to convey the freehold of a corner site for a church; gets a grant, if possible, from the commissioners; makes up the remainder himself with the assistance of the friends of the incumbent *in esse*; and then, with a church in a forward state, and a few loads of ballast to represent roads, the estate is ready for operation. Now, Brown, whose great object is to get the ground covered as quickly as possible, is far too wise to dabble in bricks and mortar himself, and he therefore betakes himself to Robinson, *quondam* builder, late from the Insolvent Court, and proposes to let him a piece of the estate, say for six houses, at a ground-rent of 6*l.* per house for fifty years, and agrees to advance him bricks or timber, or money, as the case may be, as the works proceed. Robinson, whose normal position is one of debt, and who considers that the whole art of building consists in getting materials for nothing, and putting them together at the least possible cost, jumps at the proposal, and works away as long as he can get money or materials, when, if he can let or sell, he, perhaps, reaps a small profit after payment of mortgage expenses, and goes on at the next plot; but if he can do neither, he has merely to return to the place whence he came, leaving the carcasses to Brown who has to wait the tide of

* Read at the Architectural Association, as elsewhere mentioned, by Mr. J. Wornham Penfold.

events to dispose of them to such advantage as he can, and so the estate goes on through a succession of Robinsons; Brown disposing of his improved ground-rents of 4*l.* per house from time to time, as they are realised, with the reversionary interest after fifty years, whatever that may be worth; until, by the time the estate is covered, Brown's interest in the houses has entirely ceased, and he has retired with a good round sum in his pocket, leaving the representatives of the original Jones and the assignees of the several Robinsons, at the end of the ninety-nine years, to fight over the rubbish on the estate as they may feel inclined.

First, then, it would appear that the abstract principle of building leases is the root of the evil, inasmuch as it places the interest of the builder in direct antagonism to that of the freeholder, who lets his ground at a comparatively nominal rent, on the understanding that a substantial building is erected for him thereon, of which the builder is to have the use on advantageous terms, for a number of years; whereas, the whole energies of the builder are devoted to the problem of erecting, at the smallest possible cost, something that will just last out his term, and no longer. It is, however, in practice, the shortness of the term which leads to the great mischief, by lessening the builder's interest in the ground, and consequently in the stability and character of the buildings erected thereon; and I cannot better illustrate this than by giving you a case which came under my own notice a short time since. A client requested me to inspect some property on which a loan was required of about 200*l.* described as a very eligible and well-accustomed corner public-house, distinguished as "The Inkerman Arms" (or some other equally euphonious and sensible designation), three cottages adjoining, and a plot of building ground, on which four other residences were already commenced. Now I had before been into this suburb on a similar errand, and had serious misgivings as to the security. However, I went, and by dint of persevering inquiry found the property in question, and facing it a black and stagnant ditch, while a few lifeless sticks disposed at regular intervals along its bank, scarcely formed a pretext for calling the locality Alma-grove. I was not much surprised to find the walls of "The Inkerman Arms" considerably out of the perpendicular, with serious settlements over each window. The interior arrangements accorded well with the exterior: the staircase was evidently an afterthought, and was eventually constructed something like a step-ladder, but totally regardless of head room to obviate the inconvenience of the bottom step being outside the front door. On my remarking to the landlord on the unevenness of the upper floors, he said, "Ah, sir, but the kitchen is the worst, it is upside down!" I therefore at once, by some elaborate process, descended the basement stairs, and certainly found that the floor presented a convex appearance, being about 8 inches higher in the centre than at the sides,—the earth, in fact, not having been excavated or even levelled before the joists were laid down. The cottages were at least equal to the public-house; and on going to the building ground I discovered an old man with a heap of bats at his side, which he was most ingeniously arranging in the form of walls, by aid of a cement, which seemed to be principally derived from the neighbouring ditch. On my making a depreciatory observation on the materials he was using, the old man said, "Well, I have been a bricklayer this forty-five year, and I always thinks old bricks best, especially as they makes bricks now-a-days." "And how long do you think these buildings will stand?" I asked. "Oh, they'll last out your time, and mine too, I reckon, and that's enough for me," was his reply. He had evidently not read Longfellow, and had no notion of leaving his footprints very deeply impressed in the sand of time; but the principle on which he thought and acted was only the natural result of the vicious system under which he was working. On inquiry I found the property was held on lease for only twenty-nine years, at a heavy ground-rent, and of course I advised my friend to have nothing to do with it.

Secondly, the principle of granting leases being conceded; another great drawback to the legitimate profits of building, and consequently another opening for those who are not nice about the legitimacy of their profits so that they make them somehow, is the system of underletting at improved ground-rents, by which means the estate is filtered piecemeal through the hands of mere land speculators; and, when it at last gets to the actual builder, the ground-rent is so high that, if the houses remain unlet or unsold, there is a heavy drain on the resources; and, in the event of a sale, so little margin is left for profit, that men of capital and respectability do not care to engage in such undertakings, and leave the field to those who, having no capital to risk, or character to lose, are enabled, by the use of bad materials and inferior workmanship, to speculate on a larger profit if the scheme turns out well, and if not, they are in no worse position than they were before.

Another, and, I believe, a very vital point, in the question, is the almost total absence of professional design or superintendence; at any rate, it is quite the exception when an architect is employed on the erection of any of the London middle-class habitations. It being the builder's object and interest to build as cheaply as he possibly can, it is the last idea that enters his mind to distress the conscience of an architect by the obligation he might be under to pass indifferent materials and workmanship; and his own margin of profit being so small, it seems a folly to throw away a useless guinea or two on a design for a plan and elevation, while he has ready to hand the old stock pattern of construction for all London houses, which, I presume, the experience of ages has elaborated into the one best adapted for sailing close to the wind of the Building Act, and nicely calculated just to survive a given number of years and no longer. Sometimes, indeed, an estate is placed in the hands of an architect to manage, and all plans are to be submitted to him for approval, and then there is a fine opportunity of practising the *suaviter in modo* with the *fortiter in re*, or, as the French elegantly phrase it, "Il faut avoir un main de fer avec un gant de soie," for his employer is oftentimes more anxious about what seems to be his present interest than about what is best for the future; and if too stringent conditions are placed on either design or construction, the estate will get a bad name among these speculators, and the employer will fancy his interest is suffering, though I am satisfied that it is much better the estate should be slowly covered with good houses than that a quantity of rubbish should be heaped upon it in what is almost literally no time at all.

As an architect in management of an estate, you will generally have to deal with two classes in your approval of designs: there is the practical man, who, by the application of his two-foot rule and square pencil to the back of a pattern of paperhanging, or perhaps a piece of sandpaper, submits a large parallelogram drawn to scale, with six or eight smaller parallelograms inscribed within it, such as these I now produce, which I was expected to approve as elevations of houses, the ground-rents on which were to be about 10*l.* each. However, with this character, by dint of persuasion and threats, and after experiencing some difficulties with regard to several different sized doors and sashes he has by him and intends to bring in, you may generally succeed in getting him to adopt a design of your own, provided it is furnished to him gratis. Then there is the impracticable man, who has studied architecture from a work now fortunately becoming rare, by Battey Langley. This man is often absolutely immovable, and considers his taste and knowledge of construction infinitely superior to yours, and will often leave you entirely in disgust at his genius not being appreciated, and set up his pet design on an adjoining estate.

The good management, therefore, of an estate depends on the employer's leaving it in the hands of his architect, placing sufficient confidence in him, and supporting his veto when he thinks it necessary it should be exercised. Thus far then with regard to private dwellings: and now one or two words on public buildings, the inferior and scamping workmanship of which, as seen in so many instances, I believe is mainly attributable to the cause I have just been alluding to, viz.—the introduction of men of no means or character, who often undertake contracts merely for the sake of the draws they get, which keep them for a time on their legs, and who, in this case, are chiefly introduced by that system of indiscriminate public tendering now so much in vogue with committees and public bodies, and which, however a contract may be worded as to best materials and workmanship, has practically lowered the standard of work, and, in fact, changed the principle on which it should be valued; the work being now regulated by the price instead of the price by the work; and the employers find in the end that they have not got a cheap job, but that they have a bad one. This cutting system also acts most unfairly towards the architect, who not only gets "the minimum of bread with the maximum of sweat," but is blamed if the work does not after all turn out so well as it ought, thus placing him in a state of Egyptian bondage, with bricks to make without the necessary straw. The ordinary proviso that the committee will not bind themselves to accept the lowest tender is not often a saving one, for respectable builders who look for a profit from their work, if they tender at all, are generally so far above the lowest that the acceptance of their tender is out of the question, and, as a rule, these men hold back altogether from indiscriminate tenders, as it would in effect only be advertising themselves to the public as doing work at a higher price than others, which, in these days of cheapness, would certainly not be advantageous in a business point of view.

There is yet another evil of the day which exercises great influence as I believe morally on our own profession, and, if I may so say, physically on the buildings we erect: I allude to architectural competitions as they are at present conducted. The subject has been so often discussed at length in this place, that I will now only venture on a few words, confining myself as much as possible to the effect on the buildings themselves. I believe you will all agree with me in the feeling that when a building is placed in our hands without competition, we appreciate the confidence of our employer, and devote our best abilities, whatever they may be, to the production of a design which shall meet in the best manner, according to our ideas, the requirements of the occasion, and we have then the opportunity of discussing the objections of our employer, if he has any, and modifying our plans to meet those which may be considered valid. But when we enter on a competition the case is reversed, and our great question is not what do we think best, but what will the committee think best; and we may thus be called on to execute works which will bear our name, but which even we ourselves do not think are such as ought to have been erected for the particular purpose. Of course I do not mean to infer that every one entering on a competition necessarily surrenders entirely his independence and better judgment, but a feeling, more or less, of this kind seems an inevitable *sequitur* to the system. Then, again, the sort of *ad captandum* estimates which are usually sent in with designs, and the way in which these are cut down to accord in some measure with the funds in hand, must exercise a very injurious effect on the buildings when erected. I have no doubt we could all name many buildings which have so suffered in consequence; and I will mention one case of estimating which I happened to preserve out of an old number of the *Builder*, I think in 1854, for the Brighton Workhouse and Industrial Schools. The instructions strictly limited the sum for the workhouse to 14,000*l.* and the schools to 5,000*l.* The lowest tenders for the work, even after the alterations authorized by the board, amounted to 25,000*l.* for the workhouse, and 13,287*l.* for the schools!! Such a case needs no comment, and I am not aware if the workhouse is built, or, if so, for what sum; but no doubt it would be edifying to go over it, if the tenders were eventually reduced to anything like the amounts as advertised.

The competition monster is a very hydra "*horrendum, informe, ingens,*" (I might almost go on to say "*cui lumen ademptum,*" for competition doings are often very much in the dark,) and I might occupy hours in dissecting its many heads; but such is not my present object, and I thankfully transfer the Herculean task to the more able and experienced hands of the sub-committee we have appointed for that purpose.

And now having in this cursory manner brought before your notice some of the leading evils of the present system of speculation and competition, you will perhaps think the subject rather incomplete unless I point out some remedy for them. I will, therefore, venture to note down some few suggestions, more by way of eliciting a discussion than because I think they are altogether practicable in every case; and first, with regard to the tenure of land for building purposes, there is no doubt that for this freehold is the best, for then it is a man's interest so to build that he or his successors may never have to go to the expense again; but, inasmuch as many landowners are naturally disinclined to part with their land, and builders, on the other hand, are oftentimes not in a position to purchase, we must accept leases as an institution of the country, and make the best of them. Now, the *beau ideal* of a building lease appears to me to be one which shall contain a covenant, giving the option of purchasing the freehold within a given time for a specified sum, with such a length of term that in the event of not purchasing, the builder would be enabled to recoup his capital at the expiration of the lease, having received in the meantime a fair interest for the capital laid out. In case of sale, short terms act very prejudicially, because, although the actual mathematical difference of value between a lease for ninety-nine years and one for fifty years is not very great, it is found in practice that a purchaser expects a greater interest for his money in one case than in the other: so that while in the former case 6 per cent. would be considered sufficient, which would equal about 16¾ years' purchase, in the latter 10 per cent. would be expected, equal to about 9¼ years' purchase. I know an estate in London the houses on which were built on a 999 years' lease, I believe in the reign of Queen Anne: the ground-rent is about 4*l.* per house, the houses being worth from 100*l.* to 200*l.* per annum. This, as far as the buildings are concerned, is nearly equal to freehold. Ninety-nine years is now the generally received term for what is called a long lease; and although it may be objected that it is still too short, I think it in reality gives the builder a fair opportunity of recovering his capital and making a profit, and in ordinary circumstances survives till some change takes place in the value of the locality in which the freeholder should participate, whether it be for the better or the worse. It is a common practice with the City authorities to grant leases for eighty years; and this seems to work well, at least, in the City, and in the hands of men of capital and character, as witness the new buildings in Cannon-street, Cornhill, and other places; but then it is also their practice to sell the ground-rents by tender or auction, so that the leaseholders generally have the opportunity of purchasing the freehold if they are so inclined. In my own practice I usually recommend ninety-nine years, and never, if I can avoid it, less than eighty years, and then with a clause for purchasing. The fact also should not be lost sight of, that the freeholder obtains a corresponding advantage, inasmuch as the reversion to a good house at the end of eighty or ninety years is at any rate preferable to that of a bad one after fifty years, when the freeholder would probably have to rebuild or relet his ground possibly at a reduced rent.

With regard to ground rents, they should always bear some relative proportion to the letting value of the houses on which they are secured, and I think an amount of 10 per cent. on the annual value would, perhaps, be fair, and it should not at any rate exceed one-seventh, otherwise the outgoing becomes very heavy in the event of the houses remaining empty for some time. There should also always be a peppercorn or nominal rent extending over the time which would fairly be expended in the erection, and it is usual, where a builder undertakes to cover a large plot, to allow a peppercorn for the first year, and increase the rent proportionately for four or five years, until it reaches the full amount agreed on, when he may be supposed to have an incoming rental to meet it. In the case of moderate ground-rents, also, the freeholder as well as the builder reaps an advantage, as his rents are better secured, and consequently find a readier sale and command a larger price in the market. As a case in point, I may instance some of the houses in the neighbourhood of Prince's-gate, the ground-rents on which were from 1*l.* to 2*l.* each: these were sold some time since by auction, and realized, in some cases, if I remember rightly, sixty or seventy years' purchase.

The next point is with regard to public tendering, the resultant evils of which are sometimes so great, and there are so many loop-holes and approved methods for escaping the penalties for breach of contract—a not uncommon one being that of the builder taking refuge in the Bankruptcy Court, and leaving the job entirely in the lurch—that one is almost inclined to go back to the old system of measure and value, which is certainly the most equitable arrangement, as the builder then has no object in scamping, knowing that the price will be regulated by the work, and the employer pays only for what he actually gets; but, on the other hand, the desirability of knowing the exact cost before the commencement of the work, and the natural wish to avail oneself of any accidental circumstances of position or command of the market one builder may have over another, which can only be ascertained by competition, would render the attempt almost useless to introduce that system again to any extent. The most practical method of getting over the difficulty appears, therefore, to be that of inviting tenders from a limited number of men of respectability, and then to take the lowest. It may be urged that this would often lead to a collusion among the builders tendering, and an arrangement who shou d have the job, and so the advantage to the employer be lost; but I think means might be adopted for the prevention of this, and parties transgressing would, of course, not be invited to tender again. On architectural competitions suggestions might be endless, and, as I said before, I will leave them in hands more equal to the task than mine, and will content myself with one or two observations immediately bearing on the subject we have in hand. We, as architects, have two hypotheses with regard to competitions, one being that they afford an opportunity for the display of that light which would otherwise be hid under a bushel, and give to friendless genius the chance of employment; the other being, that all competitions are conducted unfairly, and the merit of the design has little or nothing to do with the ultimate result. Now it seems evident that these two propositions cannot quite stand together; for, when a competition is decided irrespective of merit, as we suppose them all to be, it is not often the man who has no friends that is the successful competitor. In fact, it has almost become a necessity to have a friend on the committee, in order to get one's drawings looked at at all. We make great complaints of the ignorance of the judges, the smallness of the premiums, and the unfair and unpromising aspect of the conditions, but I believe the fault to be almost entirely on our own side, for little blame can attach to committees for obtaining as many patterns for their work as possible for 5*l.* or for nothing, if they think proper, when they see fifty architects at a time rushing and struggling for even the shadow of a job. We must remember that the ultimate end and object of competition is not to benefit an individual, however great his genius, but to procure the best building for the purpose required; so true is it, however, that a man cannot touch pitch and be undefiled, that we see the most capable men generally hold themselves aloof from ordinary competitions; and that almost all are more or less touched with the infection, I cannot have greater proof than the difficulty found in establishing "a Competition Code," to which, perhaps, we should not individually object to subscribe, but that we distrust each other, and fear to be shut out of the pale of competition by some more enterprising and less scrupulous candidate; and it is this feeling which will, I think, always prevent our code, when it is revised, ever being more than a string of suggestions. I am inclined to think, therefore, that until we arrive at that happy state of perfection—

> "To know what's right,—not only so,
> But always practise what we know,"—

that competitions limited to some extent would be the best remedy for the present position of the question—perhaps eight or ten would be a convenient number: a greater legal responsibility would then be thrown on the committee, who, having expressly invited certain men, would be bound by their conditions, whatever they might be; the chosen candidate, of course, to carry out the work, the second and third, perhaps, obtaining premiums, and the others being paid a small sum, which should compensate in some measure for money out of pocket. This system I do not think would be practically an injury to unknown genius, as I believe that every man of ability, who has with that combined good business habits, which are essentials of success in every profession, and eminently so in our own, will make his way: difficulties he may meet with, as every one does who has his way to make in the world, but of his ultimate success there can scarcely be a doubt. In any case, competition drawings should always be exhibited before the choice is made; and although committees are generally very thick-skinned, I think the reiterated expression of public opinion would in time make some impression.

Again (perhaps you will not agree with me), I would abolish mottoes, which, as regards secrecy, are a snare and a delusion; for not only is a man's drawing often as well known as his handwriting, but, depend on it, if the judges do not intend to act honourably, the motto will not be any hindrance to them. Let us fairly know who's who, and we shall better be able to find out and expose intrigues; while great names will have no weight with those who intend to mete out justice with an even hand to all.

And now I come to the last division of my subject, though certainly not the least in point of importance—the necessity of more general professional superintendence. And although I am one of the last to advocate legislative interference in private matters, I believe the necessity of employing at least passable materials and workmanship in our ordinary dwellings to be of sufficient importance to justify the extension of the powers of the district surveyor, or some person specially appointed, more completely over the construction of these buildings,—in fact, something like enlarging the dangerous structure clauses to buildings likely to become dangerous in a short time. With regard to the general question, we have to impress upon the public the advantage of engaging our assistance, and to dissipate that ignorance of our position and use which seems to be so universal.

Our profession is eminently one of confidence, and when that is lost or misplaced our employment is at an end; so that the remedy seems to remain entirely in our own hands, for it is hopeless to expect the public will place much reliance on a profession the members of which they see rushing like a pack of ravenous wolves at a 5*l.* prize obtainable under rather exceptionable conditions, and condescending to so many petty jealousies and intrigues for getting a job, honestly if they can, but getting it at any rate. But I believe there is a brighter future before us, and that the present gloom is only the herald of a coming change. And to this end the Architectural Association has, as I think, done much good service, and may do still more, as by its peculiar constitution it is enabled to open its doors to all who take an interest in our art, and invites every one to discuss the subjects brought before it, and to institute new courses of action and experiment in matters in which it would not so well become the senior members of our profession to interfere. The Architectural Exhibition, which was first set on foot and supported by this Association alone, must be a powerful agent in bringing ourselves and the public together, and give an opportunity for all to obtain notice, besides affording a salutary check on unjust competition decisions. It is now one of the recognised institutions of the metropolis; and I trust, when we are enabled to choose "the season," we shall compete in number of visitors with most of the other exhibitions. "The Architectural Union, again, I hope is destined to become another great rallying point for our profession and the public; and I should be sorry to see our Association remain without its walls; and I trust, if we join, we shall be enabled to carry out another project of the Association for education and advancement, viz. the extension of our classes of design and construction, to admit foremen or sons of builders,—those who hereafter will have to erect our dwelling-houses,—that so at any rate they may learn to abhor the abominations perpetrated by their predecessors, and will perhaps come at least to some of the junior members of our profession for their designs, whose time would thus be often practically and profitably employed.

I must now apologise for these somewhat crude remarks; and if the present paper is more discursive and less æsthetic than those we are accustomed to in this hall, I have at least touched upon some of the *vexatæ questiones* of the day, so as to give an opportunity for discussion, and I shall not consider my time altogether thrown away if I have succeeded in calling attention to the necessity of casting aside all these jealousies and divisions among us, and have given a stimulus to the more efficient cultivation of that manly and independent spirit which it is our boast and our privilege as Englishmen that we can exercise, and our duty as professional men to practise, and by which to hope to win and retain that confidence of our employers by which alone we can hope to maintain an honourable existence. To conclude, therefore, as an old author has done his advice and counsel to all builders, "May all builders both of palaces and particular habitations have good success, and possess them in peace and prosperity: may also all surveyors, master workmen, journeymen, and labourers, behave themselves so as they ought."

ENGINEERING AND OTHER WORKS ABROAD.

THE *Akbar* of the 12th ult. states, that the decree of April 8th, 1857, is to be executed without further delay: it commands that Algeria shall have railways, and that, in default of a company presenting itself, the same shall be commenced by the troops. The first sod on that occasion will be turned by the emperor in person, who purposes visiting that colony in a few months. Everything is ready for carrying out these orders, in case no company will construct the line from Algiers to Blidah. The line from Phillipeville to Constantine is in English hands, and will be, of course, exempt from the present decree.

On the 1st of last month the line was opened from Alençon to Argentau, on the "Chemin-de-fer de l'Ouest," a section of forty miles.

On the Victor Emmanuel Railway, destined to unite Savoy with France, twelve large boats are regularly employed on the Lac de Bourget, transporting stone from the Plombières Tunnel to Grèsine, for pitching and permanent way of the rock-embankment near St. Innocents, at Aix-les-Bains. On the Junction-bridge, over the Rhone, three Sardinian piers are finished. On the French side the foundations are in.

Mons. Feraldi, director of the *Messageries Impériales*, at Athens, has obtained the concession for the Grecian Railway from Athens to the Pyræus. It looks like the Edinburgh and Leith line, on paper.

On the 10th ultimo, the new section from Almansa to Alicante was opened, and communication, by railway, from Madrid to Alicante, completed.

By a temporary bridge over the Jarama, the section of the Madrid and Saragossa line, from the former to Guadalajara, can be opened in June: the permanent structure could be done by the end of the present year, if it were now commenced.

The Spanish Government have just given permission for surveys to be made on the following line, in the delay of one year, viz.—from La Zambla de Santa, Coloma de Farnès, passing through the territories of Mansanet de la Selva, Vidricias, Llagostera, Santa Cristina de Aro, San Felice de Guixolls, Palamos, Calonge, La Bisbal, Palafrugell, Bagur, Torrocella de Montgri, La Escala San Pere, and joining the French railways at Figuières. From Alar to Santander, on the Santander section, every effort is made for the opening to take place as early as possible: 53 horses and 162 pairs of oxen are employed: 13,563 rails, 98,653 chairs, 50 carriages and 4 engines, were supplied last year. The future importance of this line may be guessed from the fact that thirteen and a half millions of reals were received in Santander for the customs of the last half of 1857.

At Bilboa, Mr. Vignoles is expected for the railway shortly to be commenced in that town.

Tarrasa to Mauresa advances rapidly.

The first stone has been laid with much ceremony of the important bridge over the Llobregat, on the Central Barcelona line.

The Lyons and Geneva line is shortly to be opened. The benediction of the locomotives is to take place at Bourg, chief town of the department Ain, by the Bishop of Belley. The grand council of Geneva have liberally aided the railway company in promising to give the visitors from the French territories a reception worthy of their city. They have voted 20,000 francs already as a minimum sum to defray the expenses of a ball in the electoral edifice, to accommodate 5,000 persons.

At last, the railway from Paris to Vincennes (already finished as far as the Rue de Rambouillet) is to be completed with an activity that will regain lost time.

From Rheims to Réthel the rails are laid: the line is now being ballasted. From Réthel to Charleville the works are expected to be ready three months after the above section, which is to be opened in May next.

The Sedan section, or first part of the Metz line, is to be opened in November next. The Douzy section, as far as Carignan, will follow soon after.

The *Journal des Pyrennées Orientales* states positively that the opening of the Narbonne Railway as far as the Vernet station, for passengers and goods, is fixed for the 15th or 20th inst. at latest.

The contractors of the Hainault and Flanders line have taken up their quarters at Renaix. From Renaix to Audenarde the works are in progress, and next week the section from Renaix to Leuze will be attacked. The Sprielberg tunnel is commenced, near Renaix, and 300 men are employed on the heavy cutting at Nukerke.

The Belgian minister has submitted to the Chambers a project of the concession of the Gand and Eccloo Railway, according to the convention passed 27th January.

The Madrid and Badajos line is in train towards commencement. At first the shares were bought up with vigour; 1,000 were sold, and 800 taken up besides by the arrondissements. It is said that the Countess of Montijo alone subscribed for several millions of francs. On the other hand the Spanish Government gave a subvention of 6,000 piastres per kilomètre. In spite of all this, no demand was made for a commission to enter into some understanding with the local authorities as to the line. The municipal council of Mérida, however, spontaneously stepped forward to aid this important line, and have addressed a letter to the Queen of Spain praying that the Western Spanish Railway may be put up to public competition for contract. It is to be hoped that the other councils will follow the example.

The opening of the Madrid and Alicante Railway, announced in all the foreign papers to have taken place, was not to be celebrated till the 25th February, owing to the absence of sufficient rolling stock to ensure regular traffic. The steamers established by the house of Lopez and Co. between Madrid and Paris are to commence service at that period. They are 300-horse power and 1,200 tons burden.

The Spanish Government have given permission for surveys to be made from Almonte, in the province of Huelva, to some convenient point on the right bank of the Guadalquiver.

A treaty of circulation has been just concluded between the Eastern, North-Eastern, and Central Swiss Lines and the Neufchâtel and Solina Navigation Company. In consequence, passengers and goods can circulate over all these Swiss lines without changing carriages. A uniformity of charges having been established, each company can issue tickets available for the whole group. These facilities afforded to travellers cannot fail to be of immense benefit to the above companies.

The concession of the new Swiss line from Berne to Thun has been for five years in the possession of the Central Swiss Company: not having been commenced, the line is to be conceded to a new company.

At Vienna, the project of a central terminus for all the railways in that capital has been abandoned. A *Chemin-de-fer de Ceinture*, similar to that in Paris, is to be constructed.

The following is the state of the Bavarian lines to be executed in the course of 1858:—

The Nuremburg-Ratisbon, and the Munich-Landshut, to be completed and opened for public traffic; the Rosenheim-Saltzbourg, and the Linz-Vienna, are nearly finished. The actual distance from Vienna to Paris, by Prague, Dresden, Halle, Kassel, Frankfort, Mayence, Ludwigshafen, &c. is 506 leagues. When the line is opened from Munich to Vienna, the distance from Paris to Vienna will be only 369 leagues. It takes twenty-one hours to go from Paris to Munich, 242 leagues: from Munich to Salzbourg, 127 leagues, can easily be done in thirteen hours, so that the voyage can be done in thirty-four hours, or in thirty-two hours if the stoppages at Kehl and Bruchsal can be done away with The Verona-Botzen and the Inspruck-Kufstein are to be open the 1st October next.

In Piedmont there are 830 kilom. of railways. In 1848, there were only seventeen opened; in 1849, 39 kilom.; 57 in 1850; 12 added in 1851; 32 in 1853; 184 in 1854; 147 in 1855; 144 in 1856; 118 in 1857.

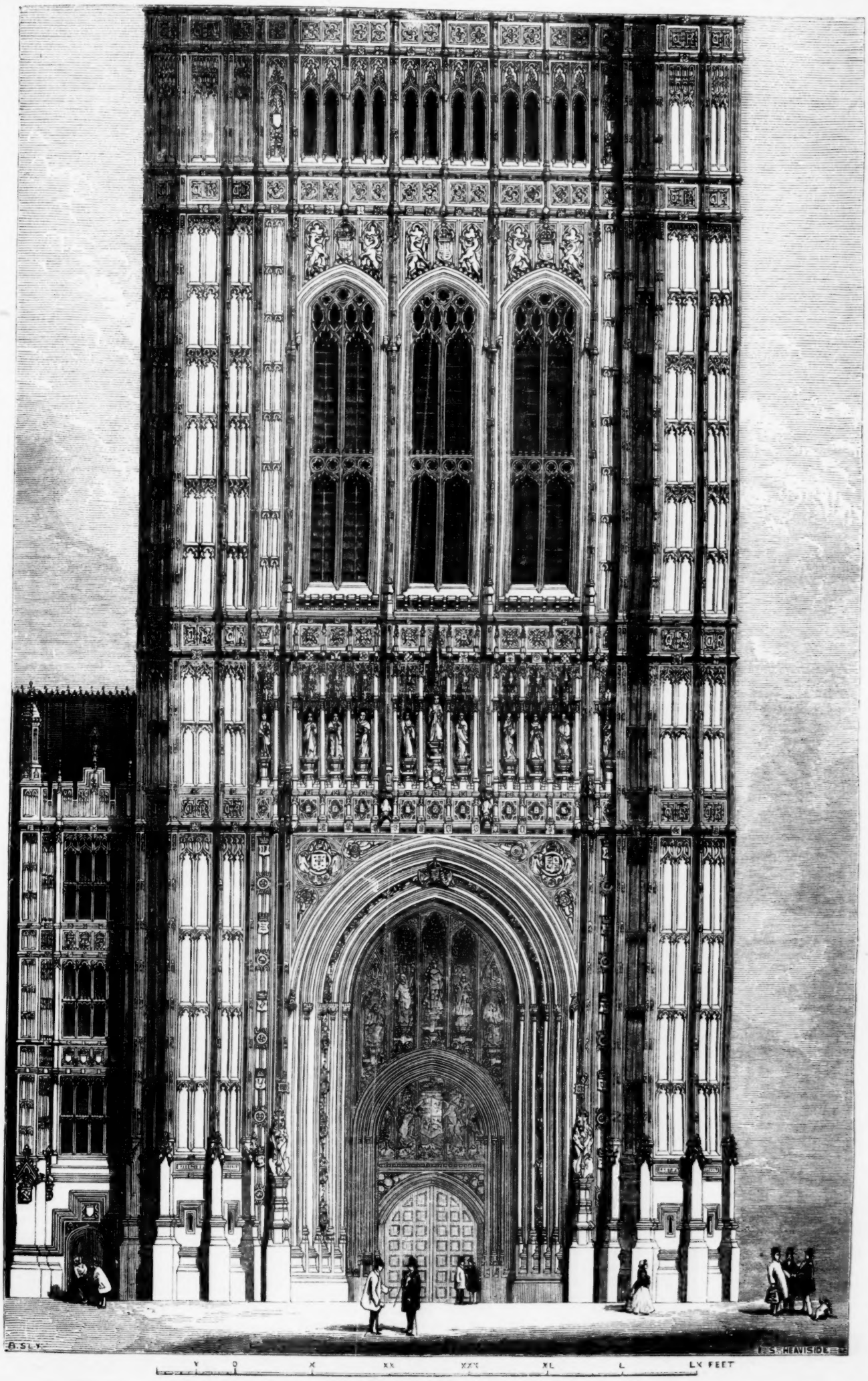
WOOD CARVING.

A VERY remarkable specimen of wood carving in small is to be seen at Messrs. Colnaghi's for a few days. It is executed in box-wood, is about 9 inches by 6 inches in size, and is a translation of a picture by Mr. Alexander Fraser, called "The Moment of Victory," including a large number of figures, a bird-cage, wonderfully cut, a game cock, and other accessories. It is not the province of sculpture to represent a picture: this error the artist will probably avoid another time; but, putting that on one side, this work displays extraordinary talent, not to say genius. The various expressions in the countenances are admirably rendered. The artist is Mr. William Bryer,—a man of business, who, having been overtaken by misfortune, is now seeking to make available a skill acquired in leisure hours. We cannot imagine that he will remain long without a commission from some of the art lovers of the metropolis.

THE VICTORIA TOWER, WESTMINSTER.

THE accompanying engraving represents the lower portion of the Victoria Tower, described by Mr. E. M. Barry, in his account of the Houses of Parliament.* In an early number we shall give a representation of the remainder of the tower, so arranged that, on binding the volume, the two may be pasted together, and thus afford a complete view to a large scale. We shall, at the same time, give a plan and some further particulars of the construction.

* See page 154, *ante*.



THE VICTORIA TOWER, WESTMINSTER.—SIR CHARLES BARRY, R.A. ARCHITECT.

THE PURIFICATION AND EMBANKMENT OF THE THAMES.

SIR,—It has been often said, touching the mudbanks of the Thames, that these, being covered and laid bare at every tide, are the sources of the most active putrefactive fermentation. This is certainly a subject which it concerns the citizens of London to have fully discussed, and yet it has of late received very little public attention. Probably it has been felt that, with commissions sitting, Boards debating, and engineers at work, to devise some comprehensive and, it was to be presumed, effectual scheme for the complete purification of London, any unprofessional opinion would be an impertinence, and discussion useless.

Since, however, the powers are at variance, the engineers divided in opinion, and the only point agreed upon is to spend seven or eight millions of money; and since the works severally proposed, though so gigantic, are still of an incomplete character; you will, perhaps, admit a remark or two on a plan now apparently forgotten, but which was calculated to effect both objects—that of cleansing the Thames as well as the City, with collateral advantages of no trifling value.

So long ago as 1841, "in consequence of the obstruction to the navigation, and the deposit of mud and silt on the adjacent shores, charged with the contents of the sewers, and with the refuse of animal and vegetable substances equally offensive to the sight, and dangerous to public health," the Thames Navigation Committee made application to the then President of Civil Engineers, who was also engineer to the Admiralty and the Trinity-House, whose attention had necessarily been especially directed to river and navigation works, to survey and report on the best method of arresting these evils.

A brief but comprehensive reply, with plans and sections, was, in January, 1842, laid before the Common Council, including reports from the hydrographer to the Admiralty (who was "most intimately acquainted with all parts of the Thames"), from the water-bailiff, from the clerk of the works, and from the chief harbour-masters—the most competent judges that could be selected; who, after a minute survey of the river, from Staines to Gravesend, agreed in recommending a general embankment on both sides, of such width as might deepen the stream, improve the navigation, wall out these mud-banks, and by increasing the force of the ebb, *pro tanto* accelerate the removal of the sewage. On this point a suggestion was also thrown out (since the question of sewers was not directly included in the application of the committee), for intercepting the sewage altogether, on its arrival at the river-side, and conveying it away in trunk-sewers, under the proposed embankments, parallel to the stream; for establishing also, over the embankments, a river-terrace (as had been proposed by Mr. Martin) with the future addition of a tram or railroad, to relieve the overloaded streets.

Now, sir, this would have been a noble work, worthy of a large expenditure, and worthy of the citizens of London; a work of which, if feasible, it is difficult fully to appreciate the advantages. The pressing evils from which London at present suffers, are a filthy river, crowded thoroughfares, and want of large spaces, where the population is dense, for pure air and healthful recreation. These *desiderata* would all be met, wholly or in part, by such a scheme. No finer promenade is conceivable in the heart of London than the magnificent terrace which would then adorn the river front, approachable from so many points, and involving no destruction of property, and no outlay for the freehold. The river would surrender a nuisance and gain strength from the loss. There can be no greater purifier of the atmosphere than a clear and full tidal stream; and, if the present pestilential mud-slope were converted into an ornamental and raised structure, and the stream pure from sewage, it would be as natural to resort to the Thames to inhale fresh life, as it is now to hold the nostril, when compelled to approach its banks.

It is difficult to understand what insuperable obstacles prevented, at the time, the execution of a work presenting such incontestable advantages, and so recommended. I believe they were fourfold,—opposition of proprietors, supposed difficulties of execution, magnitude of cost, and the jealousy of rival authorities. The committee had reported that "a regular line of embankment would so augment the advantages to private proprietors, from the improved condition of their property, that a general agreement of owners was probable;" and to obviate any valid objection on the part of wharf-owners, and to prevent material obstruction to business, the plans of the President of Engineers provided frequent openings in the wall, with approaches to the several warehouses and recesses, or little basins, for barges. Indeed, no one acquainted with the quays of Rotterdam and Amsterdam, and the business there conducted, would so disparage English science as to suppose the same thing impracticable on the Thames. But private proprietors are not wont to see with the eyes of the public, or to accept benefits without a bribe.

As to engineering difficulties, none at all were represented as likely to occur in the execution of the works on either side, if confined to embanking the river; nor any difficulties of moment in extending the work to the sewerage, and carrying trunk-sewers under the embankments, to discharge their contents into the centre of the stream below London-bridge. Undoubtedly, if the sewage was to be kept out of the Thames altogether, and conveyed by other channels to the sea, or into reservoirs to be converted into manure, very great difficulties would occur. Either inverts of considerable dip would be necessary, to be repeated at every dock entrance, and every river, inviting large deposits in the very spots where their removal would be most difficult,—or else the whole sewage would have to be raised by machinery to a higher level, and diverted inland by aqueducts or tunnels, either plan involving an expense which probably no one at that time was prepared to recommend.

The principal impediment, however, was the least worthy—that silly jealousy of interference and supposed clashing of interests which have been a bar to so many improvements, where the east and west end authorities have been called on to act in concert.

Sixteen years have elapsed since the presentation and approval of the above report, and nothing has been done. It is now proposed to spend eight millions (of course the estimate is inadequate), in simply removing the sewage out of London, and leaving the Thames and its banks unornamented and unimproved. London will, no doubt, be healthier; but, externally, will have nothing to show for so enormous an outlay. Now, is this proposed sewage-canal necessary? is it expedient? Will not half the money, judiciously spent, accomplish much more? In the first place, it has been the opinion of many scientific men that the sewage of London might be advantageously employed on our lands. Granted that at present no sufficiently economical plan has been propounded. Does it follow that, with the rapid advance of science, none ever will? Look to the history of gas-lighting, the history of Atlantic steam navigation—the history of the locomotive. If in a few years chemical skill shall invent some method of utilizing the sewage on a large scale, and at low cost, the whole of this projected fetid Acheron will have become worthless.

On the other hand, a navigable river, running through the heart of a great city, may always be regarded as its natural sewer; and, *ceteris paribus*, that will be the best line for an artificial drainage, and attended with the least expense, because involving the least alteration of the natural levels, which approximate the nearest to the river bank. Added to this, in London, it is towards the Thames that not only the ground, but all the existing sewers and streets, already incline; and no scheme of a general drainage could necessitate less change in the existing sewers than one which should lay the main artery in the mud of the Thames. Such a situation would secure another advantage which no inland scheme could command. Notwithstanding the scour from the waste of all the water companies, there will, in dry seasons, whatever the position of the great sewer, with its slight incline, be a constant tendency, as now, to accumulate copious deposits; whereas the position of the great trunk between high and low water would, by easy mechanical adaptation, give, in the dryest seasons, the inexpensive means of flushing the sewers with the whole volume of the Thames.

It will be objected that, whatever the benefits of this plan, it leaves the river still the receptacle of London filth; and that, even though discharged much lower down than London-bridge, it would return with every tide. But no safe conclusions can be drawn, from present observations, on the condition of the stream when it shall become contracted and embanked. It is the shallows, not the currents, which the sewage haunts. The Thames, at London, can never be made sufficiently pure for drinking. For our beverage we must look to the water companies. But, for all purposes of health besides this, there is little doubt but that, with a general confinement of the channel, the river below bridge would innocuously convey away all which now causes us so much annoyance and pestilence. But, suppose it otherwise, suppose it desirable, after all, to cut an inland passage for the sewage to the sea, the difficulty would seem to be no greater, or very little, in tunnelling it away from the river side, than from the spots indicated in the plans of the commissioners. The details of such a work require more engineering knowledge than I pretend to: I invite objection and discussion, only let not the opportunity be lost of a great and real benefit in lieu of a vast and extravagant scheme, which will still leave the Thames very much as it finds it. If the navigation of the river is to be improved simultaneously with the abolishment of its defilements, now is the time. The works of drainage and embankment would proceed, *pari passu:* very little change would be required in the existing drains; and, by an effort much less laborious, and at an expense proportionably slight; by combining, with a more perfect system of drainage, a quay for business, and a terrace for recreation, and hereafter a rail for speedier transit, the Thames would not only cease to be an abomination, but its depth be increased, its navigation permanently improved, and its banks, like the quays of the Seine, would become the delight and glory of the metropolis. H.

BATH.

AN appeal is being made in behalf of the extension of the Bath Mineral Water Hospital. A plan by Messrs. Manners and Gill has been issued, by which it is seen that some of the most important features in the additions and alterations are, the providing of a chapel, which has long been required; of day rooms (for want of which the recovery of patients is at present much retarded); and of an airing-ground, in which the weaker patients may take their exercise.

The cost of the proposed new buildings, exclusive of the purchase of the site, has been estimated at 14,000*l.* and the improvements in the present hospital at 550*l.*

An estimable citizen of Bath is striving to obtain a library for the inmates of the Bath Hospital. He writes us,—

"Ever since the Crimean soldiers have been inmates of the Bath Hospital, I have lent them books, which have been exchanged weekly, with military exactitude. From these soldiers I learnt that other patients coveted the privilege, and on inquiry, find that nothing is provided for the amusement of the patients but religious tracts, of which they get weary. I desire to provide them with a library for their free use. I give fifty volumes to commence, and must not rest until I get 500: less would not enable me to insist on shelves being placed in all the wards. In the Bath General Hospital, all the patients are strangers (there is another hospital for Bathonians): men come crippled with such complaints as dropped hands, and painter's cholic,—for which our hot-baths and mineral water prove a specific,—from Cumberland, Scotland, Yorkshire, and from London. There are always patients in the hospital: they come from their distant homes with nothing but a change of linen: they have no acquaintance in Bath, and time hangs heavily on their hands. I wish that time to be turned to good account, by placing in their hands books that will amuse and instruct them."

Should any of our readers desire to assist in this praiseworthy object, they may address a note to C. E. at the Bath General Hospital.

Considerable alterations to the Guildhall are proposed. According to a report and plans from the surveyor, the present Sessions Court will be entirely done away with; the space, with the Record and Court rooms, being converted into a suite of offices for the treasurer, surveyor, and engineer, and also a record-room. This alteration will render necessary a new sessions court, which it is proposed to erect over the present police station and market. The size of the proposed new sessions court will be 54 feet long by 31 feet wide, and 25 feet high—the present one being 32 feet by 37 feet, and 16 feet high. The court will be lit by four large windows and an octagonal lantern, 15 feet in diameter.

THE ARCHITECTURAL MUSEUM AND THE SOULAGES COLLECTION.

WE have already mentioned the petition to Parliament of the Institute of Architects, in favour of the purchase of the Soulages Collection, which is to be presented by Mr. Tite. We have now to add, that the committee of the Architectural Museum have agreed on the following memorial. The committee thus show that they recognise the value of *art*, whatever may be the style in which it exhibits itself:—

"The humble petition of the President, Trustees, and Committee of the Architectural Museum, founded in the year 1851, in Canon-row, Westminster, and now occupying space in the Museum building, at South Kensington,

Showeth,—That your petitioners, in thus addressing your Right Honourable House, have for their object the purchase, on the part of the nation, of the collection of Works of Decorative Art, known as the 'Soulages Collection,' and now deposited in this country.

That your petitioners, in establishing their own museum, have endeavoured to promote, by every means in their power, the advancement of the art of architecture, and of all those arts which have had their origin in, or are connected with, architectural art, their direct practical aim being the improvement of the art-workmen, to whom the execution of the details of the various arts is entrusted.

That your petitioners, being for the most part engaged in the study of the arts, are well able to judge of the necessity for providing for that great and increasing want, experienced by artists of all classes, of the means of referring to, and studying specimens of, the art of past times; and on the other hand, of the great value of museums, in supplying this deficiency in art-education, especially to artist-workmen, to whom, having neither time nor resources for travelling, such collections are indispensable.

That your petitioners are acquainted with the merits of the specimens comprising the Soulages Collection, and feel how important it is that such a very valuable and generally interesting collection should be secured for the benefit of the various classes of art-students in this country.

Your petitioners, therefore, pray that your Right Honourable House will be pleased to grant a sum of money sufficient to make it in its present complete state the property of the nation, and your petitioners will ever pray, &c."

SANITARY LEGISLATION.

SIR,—On the 16th ult., you kindly gave space for my opinions as to the desirability of forwarding the efficient drainage of London, by rendering it what it ought to be, viz.—a national question; and its primary cost for structural works paid out of the resources of the country at large. You know, sir, I am a "moon-raker," but I am none the less desirous to see giant London healthy as it is wealthy; and I am not so philanthropic as to wish to engraft the cost of London improvements upon the inhabitants of the provinces, without reciprocity of benefit.

With the immense amount of revenue derived from the cab and omnibus traffic, and the innumerable channels through which the street traffic of London contributes to the nation, we of the rural districts could hardly complain if metropolitan improvements, including sewerage, were paid from that source; but I humbly offer my suggestion that the sanitary question of the nation should become national. It would be of little avail if Cess-cum-Poolton-on-the-Hill were perfectly drained—made pure, as it now is the reverse,—so long as Sludgville-in-the-Vale, adjoining, perpetuated its moist and reeking stagnant miseries. If the power of the General Board of Health were greater, so that they need not feel the necessity of pandering to the "influential and wealthy," to whose caprice they admit they sacrifice the numerical majority;—if, permit me to say, the Board of Health were put on a fair basis as regards their enforcing efficient performance of duties in rural districts, and the cost for London and the country came out of one common fund,—we need no longer be horrified by the ravages of disease and death in districts naturally healthy but for the omissions of apathy, or, what is too often the case, the immolation of helpless masses at the shrine of "vested rights."

The paying for structural works out of one general fund would by no means saddle the already healthy, well-drained districts with payment towards the assistance of undrained localities. The millions of money at present puzzling the owners to find investment might find profitable employment; and from such source could be paid the first cost of structural works, repayable by instalments over fifty or more years; the instalments to be levied by a tax on the district, in proportion to the original cost.

If districts shall have adopted correct remedies, either by already adopting the Public Health Act, or by any other means in a position to defy complaint from the Council of Health, there would be no interference from that body, neither would the inhabitants have to contribute to the National Health Fund; but when petty huckstering, such as for years past has defied all honest and comprehensive attempts at sanitary improvement here, has foisted upon the parish that vile mockery the "Nuisances Removal Act," a committee, totally irresponsible, squandering the public money in most absurd schemes,—as, for instance, putting in many hundred yards of 12-inch culvert to receive the sewage from a 12-inch and a 13-inch;—in another part, positively making the fall of the culvert to be opposite to the direction of the outlet;—then, I say, sir, when such ignorance is displayed, it would be indispensable that the Central Board should step in and take the power from the hands of those who wield it but for mischief. You will not wonder, sir, that I have this day seen a whole district (lately drained by our "Nuisance Removal Committee") totally inundated, and a grating intended to absorb surface water was sending forth a huge fountain to deluge the inhabitants of the adjoining houses. None can wonder at the subverted purpose of the grating, when it is known that just below is the point at which the "fall" of the culvert is "up hill." In fact, there was no section of the line of culvert,—"four feet below the surface of the road,—that is all you have got to look to."

If this were an isolated case of the necessity for radical change in these matters, I would not claim space for my feeble production; but as it is a question of life and death in places whose name is legion, I implore you, sir, not only to insert this, but to increase the noble exertion you have already given in furtherance of sanitary reform.

CHLORIDE.

P.S. I, and indeed every well-disposed Briton, must thank you for your noble article (in last issue), upon the housing of our soldiers.

ST. GILES AND BLOOMSBURY PUBLIC BATHS AND WASHHOUSES.

IT is satisfactory to find an establishment which has been wisely and kindly provided for the public good answering so satisfactorily the expectation of its founders as this appears to do.

The cost of site and conveyance amounted to 5,443*l.* 10s. 10d.; cost of building, 9,378*l.* 15s. 4d.; other expenses, such as boilers, steam-drying apparatus, architect's and engineer's commission, &c. cash paid for interest on loans, &c. during the building, amounted altogether to a little over 20,000*l.* which was raised by a loan of 16,000*l.* from the County Fire-office, the remainder by rates levied on the united parishes.

During the first year, 1854, the sum received for baths, washing, &c. amounted to 1,934*l.* 8s. 6d.; the expenses, such as wages, water, coal, &c. came to 1,514*l.* 2s. 10d. which, without taking the interest of capital into account, shows a profit of 420*l.* 5s. 8d.

Next year, 1855, the sum received for baths, washing, &c. amounted to 3,524*l.* 17s. 10d.; the wages, house expenses, &c. to 2,855*l.* 4s. which leaves a profit of 769*l.* 13s. 10d.

In 1856, the receipts for baths, &c. came to the large sum of 3,822*l.* 19s. 2d.: the expenses were 3,013*l.* 14s. 1d.; profit, 809*l.* 5s.

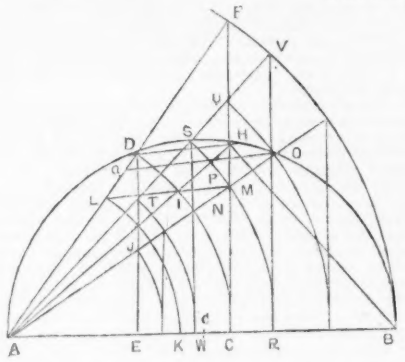
In 1857, the receipts were 3,691*l.* 2s. 4d. a sum which is a little below that of the previous year. This, however, may be readily accounted for by so many of the working classes being not sufficiently employed; however, the expenses were 2,815*l.* 18s. 11d. and the profit, 875*l.* 13s. 7d.

Included in the above cost of working expenses, are repairs, insurance, taxes, improvements in machinery, in fact, all that can fall against the establishment; and we have no doubt that, in a short time, the clear profit will pay five per cent. on the original outlay. The loan to the County Fire-office has been reduced to 13,600*l.*; and when the whole of this is paid, the profits of the baths and washhouses will be a considerable and in every way gratifying source of income to the two parishes.

It is a hopeful sign of progress to find that in this establishment, planted in a neighbourhood once notorious for filth and neglect, about 13,000*l.* have been expended in four years by the industrious and poorer classes for the sake of cleanliness.

A SOLUTION OF THE DELIAN PROBLEM.

"Fundatur, geometria praxi mechanica."
NEWTON.



DRAW the figure with rule and compasses, forming a network of similar triangles, and assuming the diameter AB = 1 and AE = x^3; or draw the figure, assuming the diameter AB = 1, and the chord AS = x. Then by similar triangles—

AE	:	AD	::	AG	:	AF.	
x^3	:	$x^{\frac{3}{2}}$	::	$x^{\frac{3}{2}}$	:	1	(1.)
AG	:	AH	::	AH	:	AB.	
$x^{\frac{3}{2}}$	:	$x^{\frac{3}{4}}$	::	$x^{\frac{3}{4}}$	:	1	(2.)
AG	:	AH	::	AE	:	AJ.	
$x^{\frac{6}{4}}$	:	$x^{\frac{3}{4}}$	::	$x^{\frac{12}{4}}$	:	$x^{\frac{9}{4}}$	(3.)
AL	:	AI	::	AD	:	AH.	
$x^{\frac{9}{4}}$	:	$x^{\frac{6}{4}}$	::	$x^{\frac{6}{4}}$	:	$x^{\frac{3}{4}}$	(4.)
AI	:	AM	::	AP	:	AO.	
$x^{\frac{3}{2}}$	:	$x^{\frac{6}{4}}$	::	$x^{\frac{6}{4}}$	:	$x^{\frac{1}{2}}$	(5.)
AM	:	AL	::	AO	:	AQ.	
$x^{\frac{4}{4}}$	:	$x^{\frac{3}{4}}$	::	$x^{\frac{6}{4}}$	:	$x^{\frac{7}{4}}$	(6.)
AQ	:	AP	::	AD	:	AH.	
$x^{\frac{7}{4}}$	:	$x^{\frac{4}{4}}$	::	$x^{\frac{6}{4}}$	:	$x^{\frac{3}{4}}$	(7.)
AS	:	AW	::	AT	:	AE.	
x	:	x^2	::	x^2	:	x^3	(8.)

By dimensions already determined in (1), (3), (6), and (8):—

AL	:	AT	::	AT	:	AQ.	
$x^{\frac{9}{4}}$	:	$x^{\frac{6}{4}}$	::	$x^{\frac{6}{4}}$	:	$x^{\frac{7}{4}}$	(9.)
AT	:	AQ	::	AQ	:	AD.	
$x^{\frac{6}{4}}$	:	$x^{\frac{7}{4}}$	::	$x^{\frac{7}{4}}$	:	$x^{\frac{6}{4}}$	(10.)

By differentiation:—

dAS	:	dAD	::	AB	:	$\frac{3}{2}$AO.
dx	:	$dx\frac{3}{2}x^{\frac{1}{2}}$	::	1	:	$\frac{3}{2}x^{\frac{1}{2}}$ (11.)

Practical examples:—

$$\frac{(FG-GH)\ (AF-AL)}{AF-AD} = FM. \qquad (12).$$

$$(\ (FG-FM)^2 + AG^2)^{\frac{1}{2}} = AM. \qquad (13.)$$

To extract the cube root of a fraction: make AB = 1, AE = n^{-1}, then AM = $n^{-\frac{1}{3}}$*.

To extract the cube root of a number greater than one: make AB = n, AE = 1, then AT = $n^{\frac{1}{3}}$;† for—

AE	:	AT	::	AW	:	AS.
			::	AR	:	AV.
1	:	$n^{\frac{1}{3}}$	::	$n^{\frac{1}{3}}$	:	$n^{\frac{2}{3}}$
			::	$n^{\frac{2}{3}}$	:	n (14.)

To impart interest to this simple problem, it may be mentioned that it engaged the attention of the ancient geometricians, and baffled all their attempts to solve it.

It is commonly called the Delian problem, from a legend that it was first proposed by the oracle in Delos: it was originally limited to the extraction of the cube root of the number two.

Archimedes, in default of better means, did not disdain to invent a machine for its solution.

J. P. W.

* Describe a semicircle ABD, draw ED at right angles to AB, with radius AD describe the arc DG, draw GH at right angles to AB, draw the chord HPIJA, make AL=AJ, and draw LIM parallel to the chord DH.

† With radius AM describe the arc RMPS, draw the chord STA, &c.

CHURCH BUILDING NEWS.

Cambridge.—A stained glass window of very considerable interest, says the local *Chronicle*, has recently been placed in one of the side chapels of King's College Chapel. It is made up from scattered fragments hitherto almost unnoticed in the chapels on the north side of the choir, and now restored as coherent wholes by Mr. Constable, glass-stainer. What the original design was, and what its extent, must now rest mainly on conjecture. As arranged at present, the figures stand (commencing from the east)—1, St. Peter; 2, St. Philip; 3, an unknown Bishop; 4, the Prophet Malachi, with text; 5, David playing the harp, with text; 6, a figure unknown; 7, a youthful Bishop, without any emblem, and which may possibly be St. Nicholas; 8, St. James, with the scallop shell on his shoulder. The tracery at the top of the window is filled with light glass, with patterns of foliage, and is closely copied from the ancient fragments. The original portions of the glass are presumed to be of the fifteenth century.

Worcester.—At a meeting of the committee for selecting designs for the re-building of Angel-street Chapel, that of Messrs. Poulton and Woodman, of Reading, was fixed upon out of seven submitted for competition; the second preference being given to the design of Mr. Paull, of Cardiff.

Pitcombe (Somerset).—The stone carving of this church was executed by Mr. Thomas Clarke, of Mells, near Frome—not Wells.

Burbage.—A memorial window has lately been erected in the parish church of Burbage, to four of the parishioners who fell in the late Crimean campaign. The quatrefoil contains the words—"Crimea, 1855," and "The Battle is the Lord's." The lower compartments contain the names of the four soldiers, and, the text, "Neither shall they learn war any more."

Llangian.—The parish church of Llangian, near Pwllheli, is to be entirely refitted, internally, and a new robing-room erected. The expense of the proposed works is to be defrayed by Mr. Richard Lloyd Edwards, who has instructed Mr. H. Kennedy, of Bangor, to prepare the necessary plans. This church is pleasantly situated, and was renovated, externally, some years since.

Liverpool.—The church of the Orphan Asylum, Myrtle-street, has recently had added to it two stained memorial windows by Lobin and Tours. The subjects are the Crucifixion and the Resurrection, and the windows are to perpetuate the memory of the late wife of Mr. Harmood Banner. Very shortly (according to the *Journal*) another stained glass window, by Wailes, of Newcastle, will be added. It is being erected by Mr. John Aikin to the memory of his mother, lately deceased.

Beckingham.—The parish church of All Saints, Beckingham, near Newark, has been re-opened, having been recently restored at a cost of nearly 1,000*l.* which has been almost entirely defrayed by the rector, the Rev. G. Marsland. The restorations have been carried out under the direction of Mr. Baily, of Newark, architect. The whole of the old pews have been cleared out, and replaced by open seats, of simple design. The aisles of the church and floor of the chancel have been laid with Staffordshire encaustic tiling. The piers and arches of the nave and the stonework generally of the interior, together with the internal facing of the wall, have been restored. The old Norman doorway on the north side has been opened, and a door with enriched ironwork has been placed in the entrance. The chancel has received insertions of new lancet windows, with a priests' doorway; and the east end has a triplet, with detached columns and arch over. Three of these new lancets are already filled with stained glass.

Ashover.—A memorial window has been erected in Ashover Church, Derby, by the incumbent, the Rev. Mr. Nodder. The circumstances which induced the gift are somewhat peculiar. In the early part of last year the house of Mr. Nodder was broken into by burglars, who, by awakening his infant child, caused an alarm which led to their repulsion, by Mr. Nodder shooting at and wounding the ringleader, who by these means was afterwards apprehended, tried, and punished. To

commemorate this event, and his providential escape, this gentleman has caused a new window to be made at the east end of the chancel of the above church, and to be filled with stained glass with appropriate subjects, and the following inscription:—"Out of the mouths of very babes and sucklings hast Thou ordained strength." Presented by Joseph Nodder, rector, and Mary Anne, his wife, as a thankoffering to God; who, on the 21st of February, 1857, in peril of robbers, saved their lives and the lives of their family by a great deliverance." Mr. Warrington, of London, has been both artist and architect.

Ripley.—The cemetery for Ripley, in Derbyshire, has been consecrated by the Bishop of Litchfield. The chapels are attached. The consecrated chapel is in the Early Decorated period, and the unconsecrated of the Early English period of Gothic architecture. Both chapels are entered at the side by ornamental timber porches of different design. A bell-turret is placed upon the west end of the consecrated chapel. Each chapel accommodates fifty persons. The cost of both was 547*l.* The walls are faced with slag from the Butterley ironworks. Many acres of land are covered with this durable yet hitherto unused material. The roofs are covered with red and black ornamental Staffordshire tiles, in bands; as also the lodge for the sexton, which is of simple design. All the woodwork, both internally and externally, is stained and varnished by material from Messrs. Swinburn and Co.'s, of London. The architect was Mr. Chas. H. Edwards, of Camdentown, and the contractor Mr. Roe, of Ripley. The total cost, it appears, far exceeds the original estimate. 1,700*l.* was the amount borrowed from the Government, and it is said that at least 600*l.* more will be required to complete the undertaking.

Melton.—The fine old church of Melton has had that portion of the unsightly gallery hiding the cross arches of the transepts pulled down, and the pews carried into the north and south portion of the edifice.

Hadfield.—The new (R. C.) church at Hadfield, in Glossop Dale, together with presbytery and schools, were opened on the 18th ult. The edifice has been erected at the sole cost of Lord Edward G. Howard, M.P. It is built in the Early Decorated style, of the durable and beautiful stone of the county, lined with brick. The dimensions of the nave aisles are 83 feet long, 53 feet wide. There is an apsidal chancel, 25 feet long, 24 feet wide, with side chapels terminating each aisle; tower at the south-west end; and north porch; presbytery and schools adjoining. This group of ecclesiastical building has been designed to harmonize with the mountain scenery amidst which it stands. The cost of the whole, including the schools, is about 5,000*l.* Messrs. Weightman, Hadfield, and Goldie, of Sheffield, are the architects, and Mr. Holroyd, of Glossop, the contractor. Mr. E. Bell has acted as clerk of works, and the church has been warmed with hot water by May and Son, of London.

Bishop Wilton.—A meeting of the inhabitants of Bishop Wilton, in the East Riding of Yorkshire, was held last week, for the purpose of laying a rate for the restoration of the church, when it was unexpectedly announced that Sir Tatton Sykes, of Sledmere, was willing to restore the edifice entirely at his own expense. The cost is expected to be between 2,000*l.* and 3,000*l.* The meeting unanimously passed a vote of thanks to the hon. baronet. Mr. J. L. Pearson, of London, is appointed the architect to carry out the work.

Doncaster.—The tower of the parish church has been completed.

Preston.—The new (R.C.) church of the Holy Cross, Croston Hall, has been opened. The edifice is a small one, and consists of a nave, chancel, south porch, and sacristy. It is calculated to seat 150 persons. The building is constructed of local course stone, with Ormskirk stone dressings. The whole of the roofs are divided and subdivided into panels. The altar and reredos are executed in Caen and Aubigny stone, enriched with marbles. The sanctuary is paved with Minton's encaustic tiles. Some columnar arcading, filled with simple screens in galvanized iron and brass, divides the chancel from the sacristy. An arch separates the chancel from the nave, on the right-hand side of which is a niche containing a figure of the Virgin. The benches in the nave, as also the chancel seats, are of pitch pine. The whole has been executed from the design of Mr. Pugin. The builders were Messrs. Lane and Lewis. The metal-work was from Messrs. Hardman and Co. of Birminghom. The cost of the church, we understand, amounts to 1,150*l.*

Houghton-le-Spring.—The parish church is to be completely restored, under the superintendence of Mr. Dobson, of Newcastle, architect, at a total cost of 1,545*l.*

Hexham.—A meeting of the seat-holders of the fine old Abbey Church of Hexham was convened by the churchwardens on the 10th ultimo; the Rev. Joseph Hudson, the incumbent, presiding; with a view to the improvement of the interior of the choir. It is proposed to remove the unsightly galleries, and erect seats in the side aisles, by which alterations a considerable increase in the number of sittings will be obtained, and the fine proportions of the beautiful arches fully developed. A spirited subscription was at once set on foot in the meeting, and the sum of 141*l.* was immediately raised.

Wallsend.—Zion Chapel, opened on the 14th ultimo, by the Methodist New Connection, is built in the plainest type of the Romanesque style of architecture, of stone from the Byker-hill quarries. The windows are glazed with Messrs. Hartley's patent quarry glass, in large sheets. The woodwork is all of Baltic red wood. The roof (consisting of tie beam, with ornamental king posts and diagonal curved struts), is stained dark, and the seats and other woodwork on the floor, light, and the whole varnished. The plaster of the walls is coloured red, that of the roof, between the spars, blue. The chapel is ventilated by means of moveable hoppers in the windows, and louvres in the roof. The heating has been provided by a Gill stove. The contractors (with the exception of the joiners, Messrs. Ornsby and Surtees, of North Shields), were from Newcastle-upon-Tyne, and the architects were Messrs. F. R. N. Haswell, and R. J. Johnson, of North Shields.

Berwick.—The Presbyterian congregation, worshipping in Golden-square, Berwick, are about to erect a new chapel in the neighbourhood of the Parade, at a cost of between 3,000*l.* and 4,000*l.* Upwards of 2,000*l.* have already been subscribed, and the tender of Mr. M. Reid, of Newcastle, builder, for its entire construction, has been accepted, his estimate for the whole of the various works amounting to 3,597*l.* 13s.

Edinburgh.—A committee of the Free Church General Assembly have purchased an extensive area on which to build a new hall of Assembly. Plans are in preparation for the proposed building, which is expected to cost about 7,000*l.* It will have a frontage of an ornamental character towards the Castlehill, and is to provide accommodation for at least 2,000 persons. The building will be situated immediately in the rear of the Free Church College, and will close up the south side of its quadrangle, thereby completing it. The hall will thus also be accessible from Mound-place, by the broad staircase ascending from the quadrangle.

Glasgow.—Two stained-glass windows have been erected in the great crypt of the cathedral, one from Dresden and the other from Mr. Ballantine, of Edinburgh, so that the public may now have an opportunity of judging of the comparative merits of British and continental artists.

PROVINCIAL NEWS.

Colnbrook.—Tenders by Mr. H. Duley, carpenter, and Mr. H. Mole, bricklayer, have been accepted for the erection of new schools in connection with the church in this place. The site selected is near the church, on the opposite side to the parsonage. The building is to comprise a girls' and infants' school-rooms; also a class-room and residence for the mistress. It is to be built from a design by Mr. Street, the diocesan architect. The cost according to contract is about 810*l.*

Chatham.—Among the works ordered to be undertaken at Chatham Dockyard, is that of extending No. 2 dock inwards, in order to render it capable of receiving line-of-battle ships: the estimated cost required this year for the undertaking is 47,000*l.* The extension of No. 3 dock is proceeding, and the works are in a forward state: 26,000*l.* will be required to complete that basin. The roof of the resting-house is also to be extended, at an expense of upwards of 2,000*l.* and works commenced for a better water supply for the dockyard. It is intended to extend and improve Chatham Dockyard, by means of convict labour, at an estimated cost of 142,000*l.*

Dudley.—The Local Board of Health have determined to commence a portion of the general sewerage of the parish, consisting of some of the main outfalls, according to the plans of Mr. Lee, their engineer, who estimated the work to be done immediately at 9,000*l.*

Plymouth.—The Commercial Hotel, erected on the site of one of the oldest hostelries in the town, with additional ground on the northern side, is now nearly completed, forming an extensive block at the corner of East-street and Old Town-street. The style is Anglo-Italian, and the building comprises two fronts, the one in Old Town-street being 60 and the other in East-street 40 feet in length: the height from the pavement to the top of the parapet is 61 feet 6 inches, divided into five stories. The angles are finished with vermiculated and lozenge-faced quoin stones. The ground-floor windows are semi-circular headed, resting on piers with vermiculated panel-work. The upper-floor windows are square-headed, ornamented with architraves, cornices, and trusses; and the main cornice, which is the most prominent feature of the structure, is supported by consoles resting on a string course. The bed-rooms will be fifty in number. The responsibility of this undertaking rests with Mr. W. Adams, of Bedford-street, as the trustee of his late brother, and the designing and superintendence of the building with Mr. Oswald C. Arthur, architect. The erection was conducted by Messrs. Call and Pethick, builders.

Llanfihangel.—There is now a prospect of the National School at Llanfihangel-yn-Howyn, Anglesea, being commenced, although some alterations from the first design, prepared by Mr. H. Kennedy, of Bangor, are contemplated. The school is to be built near the Valley Station on the Chester and Holyhead Railway, and is much required in this locality.

Liverpool.—Workmen have commenced to erect scaffolding around the two granite pillars at the principal gateway to St. George's Hall. It is reported that they are to be removed forthwith, and that they will be used in the façade of the new Free Library, in Shaw's-brow. The other outworks, erected at a large cost, are to be also removed, preparatory to a large open area being formed in front of the hall. In the hall itself the numerous casts of classic sculpture which have recently come into the possession of the library and museum committee have been distributed in various portions of the building. Each niche and pedestal in the grand hall is now occupied.

Leeds.—The Poor-Law Board has confirmed the selection of plans sent in for the proposed new workhouse, authorising the payment of the prizes awarded, and the adoption of the plans of Messrs. Perkin and Backhouse, to which the guardians had awarded the first prize. To the memorial of certain ratepayers, complaining of the manner in which the selection was made, and praying that the opinion of some disinterested and competent person should be taken upon the merits of the competing plans before a final decision is adopted, the Poor-Law Board replies by alleging that it has no power to interfere with the course which the guardians have pursued in obtaining the plans they recommend.

Bradford.—The new bank of the Bradford Banking Company has been covered in. The ground floor comprises a room 54 feet by 30 feet, and 23 feet high, in which the business of the bank will be conducted. The principal entrance is from the circular corner at the junction of Kirkgate and Darley-street. Connected with this room are a manager's and private office, and the "strong room," an apartment 15 feet by 12 feet, and 15 feet high, the floor, walls, and arched ceiling constructed entirely with massive blocks of hewn masonry. The interior is fitted up with polished stone shelving for the reception of the books in daily use. The ceiling of the large room or bank is fireproof, consisting of cast-iron girders and brick arching levelled up with concrete. On the ground floor there are also the offices required for the manager's dwelling. The whole of the entrances will be secured with wrought-iron doors, and the windows to the bank enclosed externally with Bunnett's patent iron shutters. A stone staircase, approached by a corridor from the private entrance, and connected by a vestibule to the bank, leads to the upper stories, on the first floor of which, fronting Kirkgate and Darley-street, are a shareholders' meeting-room, ante-room, sitting and reception rooms for the manager, and other accommodation. The site is very irregular in shape. The frontage to Kirkgate is 82 feet, and to Darley-street 33 feet: these fronts, with the exception of the basement, are faced with stone from the Park Spring Quarries, near Bramley. The style is Italian, more particularly that which prevailed in Venice during the sixteenth century. The basement is rusticated, and is built with stone from Calverley-wood. The ground-floor windows are arched, and divided into three compartments by Roman Ionic columns. In the upper story attached, columns of the Corinthian order are introduced, and windows embellished

with carved foliage; the whole surmounted by an entablature.

Ury.—An Aberdeen paper reports the fall of a bridge, newly erected, near Ury.

MEDALS OFFERED BY THE ROYAL INSTITUTE OF BRITISH ARCHITECTS.

The Institute Medal is offered to the authors of the best essays on—

The application of wrought iron to structural purposes.

The combinations of variously coloured materials in the Mediæval architecture of England.

A critical Essay on the Architecture and Genius of Sir Christopher Wren.

The Medal of the Institute, with five guineas, will be also awarded for the best illustrations, geometrically drawn from actual measurement, with descriptive particulars, of a Mediæval building in Ireland, Scotland, or Wales, hitherto unpublished in that manner.

The Soane Medallion will be awarded for the best design, in not less than five drawings, for—

A Circus for Equestrian Performances.

The arena to be 60 feet clear in diameter. Stabling for forty horses; green-room and dressing-rooms for performers; saloon and refreshment-room for the use of the audience to be provided. The building to be available for both day and night performances. The successful competitor, if he go abroad within three years after receiving the medallion, will be entitled to the sum of 50*l.* at the end of one year's absence, on sending satisfactory evidence of his progress and his studies.

The competition for the Soane Medallion is open to all members of the profession under the age of thirty years. The conditions may be obtained at the Institute.

The Royal and other medals awarded in the present year will probably be presented at a meeting to be held on Monday, the 12th of April.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

On Monday, the 8th, a meeting was held at the rooms in Grosvenor-street, Mr. J. J. Scoles in the chair. Mr. Culling Eardley and Mr. Hedland were admitted contributing visitors.

Mr. C. C. Nelson, Hon. Secretary, laid on the table some curious catalogues of sales by auction effected at the beginning of the present century, and read a letter intimating the approval by Her Majesty of the nomination made by the Institute for the Royal Gold Medal.

Mr. M. D. Wyatt, in the absence of Professor Donaldson, Hon. Foreign Correspondent, laid on the table a memoir of Mr. Blouet, together with some specimens of a new species of French plaster of extraordinary hardness and cheapness, the price being as five francs per square mètre, to ten francs, the price of the present material. Also some drawings bequeathed to the Institute by the late Herr Zanth, of the Wilhelma, at Stuttgart.

The Rev. J. L. Petit then read some remarks "On Byzantine Churches," illustrated extensively by photographs and coloured drawings.

Mr. Beresford Hope, M.P. in moving a vote of thanks to Mr. Petit for his paper, said, whatever their particular views as to the style of architecture best adapted for the future might be, they would all concur in admiring the conscientious, laborious, and loving manner in which Mr. Petit had treated this interesting subject. Whatever Mr. Petit entered on, he entered upon thoroughly; and whenever he whipped his adversary, he did it with a bunch of roses. They could not fail to feel the greatest interest in co-operating with him in his labour of love, and in carrying out that style, in the future of architecture, which should as admirably represent the age of the swallow-tailed coat, and of the chimney-pot hat, as the Gothic may have represented the flowing robe of the Grecian, and the picturesque, or rather no dress at all of Grecian statuary. Whatever style might ultimately by the common sense of the age be adopted, the contributions of Byzantine art would be most valuable in aiding its formation. Whether or not the Gothic might be that style, it was not for him to say, but certainly during the last fifteen years, by strange consent, that style had been adopted in this country in all matters of ecclesiastical architecture, however difficult it might be to declare that it was founded on the immutable and eternal laws of beauty. The specimens of Byzantine before them were clearly constructed with a view to meet the exigencies of the climate, and their adaptation to the religion of the day appeared to be the animating spirit. It would be difficult to trace these buildings to classical times. The mouldings and details, although not exactly Grecian or Roman, yet had a pedigree that might be authoritatively traced up to them in the rounded arch, and other features. These buildings could not lay claim to that absolute purity of proportion or simplicity of detail that characterized the Parthenon or the Erectheum. Loving as he did the Gothic, he still entertained an equal admiration for the Byzantine school, as one of the derivative styles from the one great fountain of classical architecture.

Mr. D. Wyatt thought it was perfectly possible to appreciate in the highest degree the beauties of all styles, and to feel intensely their historical reminiscences, and yet not to desire to see one particular style adopted integrally to the exclusion of others. Unless eclecticism of style in the present day was comprehensive and wide-spread, it was likely to result in farrago and confusion; and in the present day there existed a singular concatenation of circumstances, furnishing us with materials for the very elimination of this eclectic style. He confessed he did not always like to see Gothic churches rising up in the midst of compo and brick, and they were better in rural situations than in Regent-street. In many cases where Gothic was adopted, it was not done justice to; and if we could not do it honestly and with beauty, we had better adopt some other style.

Mr. Asphitel thought there was always a traditional idea that the Byzantine was of Persian or Arabian origin.

Mr. C. Barry believed that the frequent use of the tie-bar in Byzantine buildings would be found to arise from the fact of earthquakes occasionally occurring in those countries. The remarks of Mr. Wyatt as to not doing justice to the Gothic in the way of introducing thin walls and attenuated tie-beams, were applicable to all styles where the architect was large in his views, but cramped in his means. He believed the Gothic style to be more susceptible than any other of economy of cost in its application.

Mr. Penrose, while admitting that it had become the fashion to drive ecclesiastical architecture into Gothic channels, thought it was to be regretted that the earlier types of architecture had not been more thoroughly tried.

Mr. Jennings conceived the reason why Classic was not more successfully introduced in ecclesiastical architecture, was, that it was more expensive than the Gothic.

Mr. Wyatt was of opinion that, in looking at all these styles, we were too much influenced by tradition, and that the *rationale* of the matter was to adopt such style and such material as were most consonant with the wants and requirements of the day.

After some further discussion, the best thanks of the meeting were given to Mr. Petit for his interesting paper, and the meeting separated.

ARCHITECTS' BENEVOLENT SOCIETY.

The annual general meeting of this valuable society was held in the Rooms of the Royal Institute of British Architects, on Wednesday, the 10th instant.

Mr. Sydney Smirke, president of the society, was unanimously called to the chair, and made a few preliminary remarks.

Mr. Turner, secretary of the society, read the minutes of previous meetings, as also the general and financial reports, which showed that the society during the past year had made considerable progress, notwithstanding the depression which had generally prevailed in the financial condition of the country. The donations and annual subscriptions had materially exceeded those of the previous year, and almost exceeded the highest amount of any preceding year. With regard to those who had been relieved there were many distressing circumstances of unfavourable reverse of fortune. Still, the society was far from having realised the position due to it, the members on the list of subscribers being relatively small as compared with the large number engaged in the profession; and it was, therefore, much to be hoped that the sphere of their usefulness would be materially extended.

The report said:—

We know too well that a life of bright promise and fair hopes may yet be closed in grief and want; but this truth becomes far more impressive when we see it realized before our eyes. The lesson is twofold: it should teach prudence to the young, and thankfulness to those who believe themselves placed beyond the reach of such vicissitudes: a thankfulness, however, not cold and lifeless, but animated by an active desire to lighten the burden of those who have been less fortunate than themselves. It was in such a desire that the Architectural Benevolent Society originated, and on the unabated earnestness of that desire depends the continuance of its prosperity. It must not be forgotten that the Society is far from having yet reached the position that is due to it. The statistics of our profession will show that the number of names inscribed on our list bears but an insignificant proportion to the whole number of practitioners.

The Chairman, in moving that the report should be adopted, expressed his gratification at the position in which the society stood at this the eighth year of its existence.

Mr. G. Mair seconded the motion, which was agreed to.

Mr. Mocatta, Mr. Marrable, Mr. H. Currey, Mr. Poynter, Mr. Hesketh, Mr. Hodson, and others, took part in the proceedings.

The auditors' report showed that the receipts of the past year, including the previous balance of 50*l.* 6s. 2d., the subscriptions, 175*l.* 6s., donations, 75*l.* 11s. 7d., and dividends, 21*l.* 2s. 10d., amounted to 322*l.* 19s. 1d., from which remained a balance of 63*l.* 18s. 6d. There were 786*l.* 6s. 8d. in the Funds, and subscriptions due amounting to 57*l.* 15s.

This was also adopted, and the re-election of the council and the other officers for the ensuing year took place.

Thanks were then unanimously awarded to the president and council; to Mr. Turner, the hon. secretary; and thanks having been unanimously awarded to the chairman of the day, the meeting broke up.

THE BIRMINGHAM ARCHITECTURAL SOCIETY.

On the 1st inst. Mr. George Dawson delivered a lecture to the members of the Birmingham Architectural Society, in the Lecture Theatre, Cannon-street, on "The Duty of Society in Relation to Architecture." According to the local *Gazette*, Mr. Dawson commenced by stating that architecture was one of the most interesting studies for an amateur. He pointed out the extreme importance of public attention being directed to it, on account of the publicity and durability of its works, which were, in fact, a history in stone of all great deeds. A bad picture might be destroyed, or be hidden in a private dwelling; but a bad building, which no one dares burn, and which costs too much to be pulled down again, abides and afflicts by its unceasing ugliness. After glancing at the glories of the architecture of the Middle Ages, and tracing the causes which led to its declension, the lecturer adverted with some severity to the state of several of the public buildings of Birmingham, remarking that most of the incongruities in their buildings were owing to the public, and the impossibility of laymen being able to judge from mere plans of the ultimate effect of a design, for the architect was too often obliged by the necessities of competition to adopt any of the suggestions which fashion might call for or economy require.

[It seems an odd notion for architects to call in a layman, even so eloquent as Mr. Dawson, to lecture to *them* on "The Duty of Society in Relation to Architecture."]

A SEWAGE QUESTION.

HIGGS *v.* GOODWIN.

This case was tried at Hertford Assizes on Thursday, 4th inst. before Mr. Justice Erle and a special jury.

The plaintiff is a chemist in London, and patentee of a process for treating town sewage with lime, so as to cause precipitation: he brought an action against the Hitchen Board of Health (through the clerk) for an alleged infringement of his patent right.

The Hitchen Board having unsuccessfully defended two actions brought against them by a miller for contaminating the mill-stream which forms the sewage outfall; under the advice of the General Board of Health, they employed Mr. Henry Dangerfield, C.E. of Cheltenham, to erect some works for purifying the sewage, similar to those he has constructed in his own town, which consist of spacious covered tanks into which the sewage flows, and remains in a state of rest a sufficient time for the solid matters in suspension to precipitate by gravitation: the supernatant water is then drawn off by an arrangement of syphons to a large filtering-tank, where the water passes through strata of flint, sand, &c. and deposits particles held in solution. The water, after leaving the filter, is clear, but fœtid: to deodorize this, according to the statements on the part of defendant, lime-water trickles in from a cistern above: it flows a short distance in a covered chamber, and at its exit into the open air it is devoid of colour or smell.

Mr. Higgs's patent is to add lime in the *first* instance, to cause precipitation: Mr. Dangerfield's plan is to add lime in the *last* instance, to cause deodorization. The jury found a verdict for the plaintiff; amount of damages to be found by arbitration.

By this decision it is illegal to put lime into a cesspool, or to use it as a deodorizer for any sanitary purposes, without paying for Mr. Higgs's license. The patent has only two more years to run, but an application will be made to the Court of Queen's Bench for a reversal of this decision.

A HINT TO BRICKMAKERS.

As you have been favouring the potters with a few hints, I venture to offer one or two for the benefit of our brickmakers.

A great deal has been said of late about ornamental brickwork, and some creditable attempts have been made to obtain an effect by the use of moulded bricks. Still we cannot expect a general revival of the art until moulded bricks of every variety can be readily and cheaply obtained of the brickmaker. There is less difficulty in the country; but in London the introduction of a little ornamental brickwork generally involves a considerable delay and expense in the carrying out of the works. I think our London brickmakers would find it to their advantage to keep in stock a considerable variety of moulded and splayed bricks. When the duty was abolished great anticipations were indulged in; but unfortunately they have not yet been carried out; and strange to say the price of bricks is not much affected by the removal of the impost.

Why should we not be able readily to obtain arch bricks, splayed bricks, and skewbacks of every kind, not only in the superior kind of brick, but in the ordinary stock? Why, also, should we not have larger bricks than are at present made? Bricks of the length of a brick and a quarter, or a brick and a half (or even two bricks, if they can be made), would be very useful, and would enable us to obtain a better bond.

AN ARCHITECT.

A RAILWAY FOR LONDON STREETS.

I HAVE long been watching every plan proposed for a quicker and more convenient method of travelling through London, but all as yet seem to fail. Now, as one plan, though it may not answer, often suggests thoughts for improvements, and another starts out of it that will, I propose simply to erect a single line of railway on iron pillars along the centre of the principal streets, sufficiently high to allow of the usual traffic underneath. The carriages to be as most convenient in shape and fittings, to be propelled by fixed engines and ropes, with some contrivance, if required, to deaden the noise.

We might thus travel from Notting-hill to the Bank, in a direct line, having stations at the Marble Arch, Regent-street, Tottenham-court-road, Holborn-hill, or where best. This might be accomplished in about fifteen or twenty minutes, with but trifling loss to the public thoroughfare. One or more carriages might start from each terminus at the same time, every eight or ten minutes, passing by a loop line mid-way, say Regent-circus: thus conveying, both ways, if I say only 100 passengers each journey, they would carry 14,400 every twelve hours. R. M. MAJOR.

*** The proposition, as our readers know, is not a new one. We print it to keep the subject alive for discussion.

COTTAGE BUILDING.

VENTILATION.

I CAN bear testimony to the truth of Lord Shaftesbury's remarks in your leading article of February 20, respecting the ventilation of labourers' cottages. I was at a pair of cottages, one of which is just inhabited, and on going upstairs I found paper pasted over the gratings leading to the air-flues. I should be glad, with many others, to know his lordship's stratagem of concealing the ventilator, as I would most certainly adopt it. The cottages we have been building are very commodious and airy. The general arrangement is as follows, viz.:—an entrance-lobby, with staircase in it, and door opening into the living-room, size, 14 feet 6 inches by 13 feet 3 inches; back kitchen, 14 feet 6 inches by 7 feet; and pantry, 7 feet by 7 feet. There are three good bedrooms opening off the landing, and also a small closet; two fireplaces, fitted up with iron chimney-pieces, to form grates, with fire-brick linings. In the living-room is a fireplace suitable for burning wood on the hearth without smoke, and constructed to reflect the greatest amount of heat into the room, and also to heat the air entering at the back of fireplace. The same arrangement heats the air in living-room, from back of scullery fireplace. One brick oven serves both cottages, being so arranged as to have its own door in each cottage. They are covered with tiles, and have O-G brick cornices, and chamfered plinths and quoins. There is also a safe in the pantry, with perforated zinc, so that fresh air cannot be shut off from it.

Langton. H. CHILDS.

NOTES UPON IRON.

THE reports by ironmasters on 'Change at Wolverhampton on Wednesday last, were to the effect that the state of things last reported was fully maintained in the experience of the first-class houses this week. Scarcely half-a-dozen such houses, however, are in full gear; and those of less note have only a very small proportion of their machinery occupied. Liverpool merchants maintain that orders are being executed in South Staffordshire at rates considerably below those generally quoted.

GLASGOW ARCHÆOLOGICAL SOCIETY.

THE concluding meeting of this society for the winter session was held on the evening of Monday, the 1st inst. Mr. Wm. Burns in the chair. The secretary read a letter from Mr. John Buchanan, regretting his unavoidable absence, and describing several interesting Roman antiquities, principally coins, and articles of jewellery, in his possession, found in the neighbourhood. He observed that the 6th Legion—a detachment of which lay for some time at Kirkintilloch, had previously been present at the siege and capture of Jerusalem under Titus. This legion came over to this country with Hadrian about the year 120, during his memorable tour of inspection of the Roman fortifications in Britain. It was a crack corps, and bore the title of "The Vanquisher." Its headquarters were at York, and it remained in this country till the very last days of the Roman power and the advent of the Saxons. Most of the Roman forts are now levelled. The ditches at the Kirkintilloch fort are the only specimens left at any of the sixteen which guarded the wall from one end to the other. The wells for supplying the garrisons are still extant.

Dr. Stewart then read a paper "on that part of the Roman wall which passes through the parish of Kirkintilloch, and the Roman antiquities found in the neighbourhood," which was illustrated by numerous drawings and specimens, and gave rise to some animated conversation.

Mr. Macfarlane, architect, read a paper entitled "Notices of some Ancient Heraldic Sculptures in Glasgow," in which he referred to the importance of heraldry as an architectural accessory, and as a means of tracing the history of ancient buildings. The paper was well illustrated, and contained a great deal of information peculiarly interesting to local antiquaries.

FEEDING LONDON.

THE luxurious Romans, at the time of their decline, considered that the oysters from Britain, a favourite dish, were better when in such a state of putridity that few gourmands of the present day would like to come within some distance of similar dainties; and it is not many years since it was the fashion in this country not to eat the different kinds of "game" until they were "high," and in as unwholesome a state as the oysters of the ancient Romans. The contrast between the former size and rate of speed of the ships which slowly and dangerously carried the "natives" to Rome, and the huge steam and other ships of the present day, is great.

In the old Roman days it was scarcely possible to get the British oysters in a lively state over the sea, and so it became a fashion to eat the dishes which were taken with so much cost and difficulty to the imperial city in such condition of freshness as they could be had.

In those days of England when "high game" was in such favour, the roads were so bad in many parts that the conveyance of grouse, partridges, &c. was such a slow process that it was seldom that this description of food could be got to the metropolis in a fresh state; and in consequence, as was the case with the oysters in Rome, it became the fashion to eat the game when in a most dangerous condition. Now that venison and grouse can be brought from the remote parts of Scotland in the course of two days, and when railway trains fly with equal rapidity from other places, the taste for "high game" has declined, and people inspired with sanitary knowledge wonder how it was possible that such pungent vivers could have been borne with.

A little more than half a century ago it took about six weeks to drive the herds of cattle from the north of Scotland to the metropolis: now they can be whirled here in a few hours. Fish in great variety may be caught in the morning on the coast of Berwick and Coquet, and be boiling in the kitchens of Belgravia on the same evening for dinner. In exchange for the sheep and beeves from the highlands and Cheviot, the choice fruits and early vegetables of the south are rapidly passed. By means of steamships and other quick sailing vessels, the oranges of Spain and Portugal, the grapes of France and Italy, and the oxen, sheep, fruits, &c. of other foreign parts are brought in fine condition; and delicacies which were not easily obtained even by the rich are now common amongst the multitude. But for this increased facility of conveyance how would it be possible to feed the immense multitude of London, which, in half a century of time, will in all probability number 5,000,000?

IMPROVEMENT OF CONSERVATORIES AND FERNERIES.

I AM neither an architect nor a gardener; I may therefore expose myself to criticism for presuming beyond my vocation; yet I venture to suggest a thought I have concerning those luxurious and beautiful flower-pleasures which are becoming more and more part of the national taste, and which, by diverting riches from their old courses of heavy and extravagant feasts and ostentatious equipages in which our forefathers indulged, improve our health, refine our enjoyments, and lengthen our lives. A grand house admirably appointed is a noble thing, and one of its choicest ornaments is, or might be, a greenhouse. But a greenhouse is not a place to abide in, where one can long revel amid our blooming favourites: the air is offensive, unwholesome, and soon is poisonous.

I propose that, instead of the usual greenhouse, an apartment should be constructed of any dimensions, suitable for a dining, drawing, or ball room. One side of it, where the usual fire-place is, should be against the solid wall of the house; and the other three sides should consist of a double glass wall, with an interspace of from 12 inches to 24 inches; and that *this interspace should be the conservatory*, which may be continued along the roof of the room, so that the roof should be of double glass and hollow, which will allow for tender and beautiful climbing plants. Thus we should have an apartment to sit in (as fresh and commodious as any of our best arranged rooms), where we can view our plants, flowers, and fruits—themselves making, indeed, the wall decoration,—and see beyond and through them, our open-air garden, fields, mountains, and, so far as the *eye* is concerned, be at once in our greenhouse and in our ordinary sitting-room. For our other rooms we might still have the landscapes of Linnell or Boddington, and the flowers and fruits of Mutrie, Hunt, or Lance; but this our room with walls of glass would be ornamented all round with the choicest originals, blooming undisturbed and uninjured by sudden or incessant changes of temperature. Glass is cheap; and such a room, with double glass walls and roof, might be made at no great cost, but its beauty might be enhanced by any amount of elaborate and expensive devices. It would be a crystal drawing-room, brilliantly light, cheerful, warm, well-ventilated, and its walls all painted by nature. J. H. ELLIOTT.

SWEARING IN THE WORKSHOP.

WHEN Sir Christopher Wren was building St. Paul's Cathedral, he caused the following notice to be affixed to several parts of the structure:—"Whereas, among labourers and others, that ungodly custom of swearing is so frequently heard, to the dishonour of God and contempt of authority; and to the end that such impiety may be utterly banished from these works, which are intended for the service of God, and the honour of religion; it is ordered that profane swearing shall be a sufficient crime to dismiss any labourer that comes to the call; and the clerk of the works, upon a sufficient proof, shall dismiss them accordingly: and that if any masters, working by task, shall not, upon admonition, reform the profanation among his apprentices, servants, and labourers, it shall be construed his fault, and he shall be liable to be censured by the commissioners."

BOTTLE-NECKED THOROUGHFARES.

THE grievous stoppages in the great thoroughfares of London, from Aldgate to Somerset-house, are seriously felt by all business persons, and various remedies are suggested. The remedy by tunnelling is clearly impracticable. The evil arises from the general narrowness of the entire line of thoroughfare, but it is greatly aggravated by the series of bottle-necked ways to be found in the above line. The traffic emerges through these pent-up passages in the same fashion as water escapes out of a bottle, a little at a time or none at all.

A person entering London at the east end first meets this difficulty at Aldgate; then at the entrance of Leadenhall-street; then he comes to a four-crossway at Gracechurch-street: he proceeds on, and finds the traffic again nearly choked at the Poultry, and quite strangled at the corner of St. Paul's-churchyard next Cheapside; and, in order that there may be no jealousy felt with respect to that secluded edifice, St. Paul's Cathedral, the traveller finds (preserved for the sake of uniformity only) a like narrow neck at the opposite end as he enters on Ludgate-hill. He proceeds on to St. Dunstan's Church, where he is stopped by two or three houses projecting far into and narrowing the road, as though they were only intended to give the inhabitants of them a side view down Fleet-street,—but in truth they are useful to prepare him to contend with the difficulties of Temple-bar, which is about as comfortable a ligature on traffic as a tight neckcloth round the neck of a plethoric citizen, who has just emerged from the Guildhall with as much turtle soup as he can carry. His difficulty, however, does not end here: his neckcloth must be drawn a little tighter, for he must squeeze through the narrow straits between St. Clement Danes and Somerset-house. Then he may begin to breathe, and thank his stars if he has escaped being run over, and his loose cash has not found its way into some loose stranger's pocket.

In sober seriousness, what is to be done? Can the evil be effectively remedied? No, it cannot: the expense is too great. Can it be mitigated? I think it may, at comparatively little expense. Let us begin at Aldgate. The few obstructing houses there may be (and I believe are about to be) removed. Leadenhall-street being relieved by Fenchurch-street is a minor evil, and must remain, as it would be too expensive to deal with. Now we come to the greatest of the evils, the four-crossway at Gracechurch-street and Cornhill. Take down each of the four corner houses, and make a circus as at Piccadilly, round which the traffic might revolve. Throw back the houses on the south side of the Poultry about 20 feet: the frontages would nearly repay the expense. Take down the box-makers' and Cathedral Coffee-house at the east end, and Dakin's, the teadealer (and, for the sake of uniformity, and to give an opening to the cathedral, the bookseller's), at the west or opposite corner. Take down the two or three houses between St. Dunstan's Church and Praed's, the banker, and remove time-honoured Temple-bar. The entire block of houses constituting the north side of the Strand, and the whole of Wych-street, might be demolished and rebuilt as a profitable speculation. There is much of "take" and "remove" in all this, like a doctor's prescription; but remember the health of "the corporation" requires it.

The relief afforded by these suggested improvements would be so great, and the expense comparatively so small, that I feel assured the citizens of London would gladly raise the amount by a voluntary rate.

The remedy of removing the corner houses of four crossways might with great advantage be applied to other parts of London, especially at the junction of Lombard-street and Fenchurch-street, by supporting the church tower upon an archway, and using it for passengers.

A LONDON CITIZEN AND SUFFERER.

RECENT PATENTS.*

C. BAYLIS.—*An improved Method of Constructing and Arranging Roads and Ways particularly applicable to populous Cities and crowded Thoroughfares.* Dated March 10, 1857.—The patentee combines a tramway with roads for ordinary carriages and foot passengers, so that the traffic on both can be carried on without interfering with each other. Provision is made for the sewers, also for the gas and water pipes and telegraph wires, by excavating the ground, and building three tunnels side by side and parallel to each other. In the centre one he places the main sewer, and in the others the gas and water pipes and the telegraph wires.

B. H. PAUL.—*Improvements in the Preservation of Stone, either natural or artificial; also of Cements and other similar Compositions.* Dated April 1, 1857.—This consists in applying to the stone, &c. solutions of aluminates (of soda, potash, &c.), also of the zincates (of soda or potash), or phosphates of alumina, or zinc in solution by alkalis; also similar preparations of lead or molybdenum. These are employed either alone or mixed with finely powdered silica, carbonate of magnesia, baryta, or zinc, sulphate of baryta, French chalk, &c.

G. J. GUNTHER.—*Improvements in preparing Blocks and Stones for Building Purposes.* Dated March 21, 1857.—The blocks are moulded so that only four sides form plane surfaces, the upper and lower side forming two inclined planes, which converge towards each other from the edges to the middle, so that the direction of the furrow which is formed by the two inclined planes on the upper side forms a right angle with the direction of the furrow which is formed by two inclined planes on the lower side. The blocks are dovetailed together crosswise at right angles. The inventor forms another block having grooves on the opposite sides, and at right angles to one another. Stones thus shaped are held together without cement.

G. T. BOUSFIELD.—*Improvements in Machinery for compressing Clay and other Materials, applicable to the Manufacture of Bricks and other Articles.* (A communication.) Dated March 5, 1857.—One or more moulds are attached to a mould-carrier, which is moved up and down between guides by an eccentric on the main axis of the machine. The moulds are bottomless, and into them fit plungers, which receive motion from cams placed on the same axis as the eccentric; and there are also other plungers attached to the top framing of the machine which enter the moulds when they are moved up by the eccentric.

ROBERT MALLET, Bridge-street, Westminster.—*Tiles and Coverings for Roofs and other Parts of Buildings.* Dated June 24, 1857.—The patentee constructs roofing tiles of metal or glass, or of pottery or other suitable material, of a square, or lozenge, or similar form, adapted for being placed diagonally on the roof. The upper angle or cornice of the tile, and the two upper edges which meet there, are bent up or made higher than the general surface of the tile. The upper corner has also a hook or projection beneath it, which catches or holds on the laths or purlins which run horizontally along the roof. It has also a hole through it, which receives a screw or nail, which further secures it to the purlin or lath. The two lower edges of the tile are turned downwards, or made to project below the lower surface of the tile. The two side corners of the tile have notches or small recesses, which meet those in the adjoining tiles, and are covered with a small plate or washer, secured by the same screw or nail which secures the top corner of the tile below. Each of these side corners has a rib or raised part on the upper surface, which protects the screw-holes from the entrance of any water flowing down the roof. [There are various other peculiarities described, and also as to ridge and other tiles.] The transparent tiles may be introduced as skylights or windows in roofs or coverings composed principally or partially of the metallic or opaque tiles. By employing glass tiles of different colours, arranged alternately or in patterns, beautiful and various effects may be produced, and the overlapping of the different colours enhances the effect. The glass tiles may be stamped or pressed to the required forms from the soft or melted glass, or from sheets or plates of glass softened by heat. The metallic tiles may be cast or stamped out of sheet metal. They may be of iron galvanized or coated with zinc, or tin, or lead, or any suitable combination of these metals, or painted or enamelled, or of copper, or other suitable metal or alloy. Tiles of pottery may be pressed in moulds, or shaped by the ordinary processes. The form of the edges or laps of the bricked or domed, or pyramidal or conical tiles, may be varied, provided that they are so arranged that the rain or water which may fall upon them is conducted down from one to another without being able to return under or pass between them. The whole tile may be curved when it is desired to cover a curved roof.

C. C. DENNETT.—*A New Construction of Floors and Ceilings of Buildings.* Dated March 9, 1857.—This consists of fire-proof arches composed of the sulphate of lime and an artificial Puzzolana, of burnt clay or porous cinders, further strengthened with laminæ of wood or iron, which arches form both floor and ceiling in one substance.

W. E. NEWTON.—*A Preparation of Materials for Coating Roofs, or other Portions of Buildings, to render them Impervious to Wet.* (A communication). Dated March 3, 1857.—This compound is peculiarly designed for roofing. The following are the ingredients:—Caoutchouc dissolved in spirits of turpentine; gum shellac dissolved in alcohol; gutta percha dissolved in linseed oil; a mixture composed of pulverized glass, quicklime, and plaster of Paris; and another mixture, composed of vitrified glass, sand, flint, gravel, or any equivalent pulverized substances which will withstand the action of the atmosphere. To these is to be added naphtha or coal tar.

STANISLAS TRANQUILLE MODESTE SOREL, Paris.—New chemical compositions producing either house paintings, cement, or plastic paste to be moulded. Dated June 19, 1857.—The several chemical compositions of this invention are obtained by combining the following substances in suitable proportions:—First, chloride of zinc, or any other chloride which is *amorphous* with it, namely, either chloride of iron or of manganese; second, a tartrate; third, muriatic acid; fourth, a feculent or amylaceous substance; fifth, water; sixth, oxyde of zinc. The said substances are combined in various proportions according to the nature of the products required. Any of the aforesaid substances may be replaced by others possessing similar properties, and any of them could be omitted and new ones could be added.

H. Y. D. SCOTT.—*An improved Manufacture of Cement.* Dated Feb. 19, 1857.—This relates to a process patented by the patentee, April 17, 1856. The object here is to impart to quick-lime the properties of a cement. Lime is by mechanical means reduced to a powder, and mixed with from five to ten per cent. of its weight of gypsum, sulphate of lime (plaster of Paris), sulphate of iron, or sulphate of magnesia.

L. E. DEPLANQUE.—*An improved Composition for Sharpening and Setting Fine-Edged Cutting Instruments.* Dated March 28, 1857.—This is a combination of vulcanized caoutchouc with vegetable and mineral substances.

G. T. BOUSFIELD.—*Improvements in treating India-Rubber and Gutta Percha, in order to render the same impermeable to illuminating and other Gases.* (A communication.) Dated April 6, 1857.—This consists in applying linseed oil, in a heated state, to the surfaces of tubes of vulcanized India rubber or gutta percha when in a heated state.

W. E. NEWTON.—*An improved Manufacture of Tracing Cloth.* (A communication.) Dated March 5, 1857.—Spirits of turpentine or camphine, castor-oil, Canada balsam, and balsam copaiba, in certain proportions, are well mixed, applied to the tracing muslin by means of a sponge, or otherwise, and, when perfectly dried, it is fit for use.

J. STANLEY.—*Improvements in the Construction and Mode of applying Cranes and other hoisting Machines, to hoisting, suspending, lowering, and weighing purposes; also, in generating, transmitting, and applying Motive Power for the same.* Dated May 4, 1857.—This invention applies, first, to wharf-cranes, and all others to which steam-engines are attached and made to turn round their vertical axes with the crane, and provides that the steam-boilers be attached to and carried upon the moveable parts of such cranes, or made to form the centre column or main support thereof, in order that the engines may be supplied with steam without passing it through the pivots or vertical axis, &c. 2nd. To the construction of the boilers of hoisting machines, and provides that their fire-boxes, tubes, &c. be corrugated, fluted, or reeded. 3rd. To the mode of transmitting the power of steam in the operation of hoisting, and provides that in connection with hoisting machines (to which the power of steam produced at any considerable distance is to be transmitted), turbine water-wheels be erected, and supplied with water forced through pipes by the steam, and that the power of such turbines be applied to the hoisting machines. 4th. To the construction of steam-engines connected with cranes and hoisting machines, the working of which is intermittent, and provides that the engines be made to work horizontally, that their exhaust passages be connected with the inside of the cylinder on their under side, &c. 5th. To the variety of degrees of power required in steam hoisting machines, and provides that the engines be arranged to work singly, or two or more together, &c. This invention includes fourteen divisions: the remainder require engravings to illustrate them.

P. A. L. DE FONTAINEMOREAU.—*An Improved Truck Apparatus for Moving and Transporting Stones and other heavy bodies.* (A com-

* Selected from the condensed lists published in the *Engineer, Mechanics' Magazine*, and other journals.

munication.) Dated April 16, 1857.—This apparatus is composed mainly of two supporting rollers and a frame, these rollers being one in advance of the other, and each being of the form of a truncated cone.

E. MANICO.—*Improvements in obtaining Foundations for Marine or other Structures.* Dated April 24, 1857.—The patentee employs a hollow fabric of iron of any shape. The capacity of the caisson is usually a cubic yard, which will contain about one ton of stone, and when bedded in sand or shingle, the interstices between the uneven sided stones will receive from 10 to 12 cwt. of sand or shingle, which will work into the caisson, and form a solid mass, and with the iron of which the caisson is made.

S. RAMSDEN, Hunslet, Leeds, Yorkshire.—*Fixing of Window Sashes.* Dated July 17, 1857.—This invention has for its object the more convenient removal of window-sashes from their frames when required. The sashes slide up and down the frames in the usual manner, and are provided with the ordinary cords and weights; but instead of the cords being affixed permanently to the sash, as is usually the case, they are attached thereto by a contrivance which is denominated a self-acting lock. The lower part of the mouldings within which the sashes slide are made loose, so as to be removable, and one of them is fastened in its position by screws, and the other by means of a flush bolt, or other convenient and analogous contrivance. In order to prevent the window cords from slipping away when the sashes are taken out, a clasp can be fixed in the window frame and made to press or bear upon the cords, and thereby retain them in position until they are again attached to the sashes.

J. LESLIE.—*Improvements in Apparatus for Ventilating Buildings.* Dated May 4, 1857.—Here an air-shaft is fixed to the ceiling so as to rise through the roof, and on the exterior of the air-shaft is an inclosed chamber, open at bottom and closed at top. The heated atmosphere of the building will enter the inclosed chamber around the air-shaft, keep it warm, and thus induce a rising current through the air-shaft.

T. J. COOKE.—*Improvements in the Manufacture of Knobs, Roses, and Escutcheons used for Doors, Drawers, Shutters, and other similar purposes.* Dated May 2, 1857.—The knobs are made partly of brass and partly of iron, and the roses and escutcheons solely of sheet iron. The invention comprises improvements in ornamenting the same, and also in ornamenting ordinary articles of the same kind which are made of brass, by any of the known japanning, enamelling, painting, or inlaying processes.

C. W. RAMIE.—*Improvements in the Mode of attaching Knobs to Spindles.* Dated May 7, 1857. The patentee makes use of a square spindle, on the angles of which a screw is cut. At the inner end of the knob is attached a nut, which is free to revolve about its axis, and tapped to fit upon the screwed angles of the spindle. To this nut is attached a washer or escutcheon plate, whereby the nut may be caused to revolve, and the knob thus drawn forward upon the spindle, the end of which, fitting into a corresponding hole in the knob, prevents the latter from revolving thereon.

RECENT AMERICAN PATENTS.*

R. T. HAVENS, Casstown, O.—*An Improvement in Preparing Roofing Cements.*—Claim: The process of combining and pressing coal tar and sand with paper or wood, for the production of an artificial slate.

WM. H. CARVER, Covington, Kentucky, and J. BECKLEY, Cincinnati, Ohio.—*An Improvement in Mastic Roofing.*—Claim: The precise manner employed of mixing and compounding the ingredients, and applying the cement when combined with the proportions of ingredients, by which process of mixing and compounding, and combination of ingredients, and applying the cement to use, we are enabled to decompose or destroy the ammonia contained in the coal tar, to prevent it from destroying the cement and eating the canvas on which it is spread, and at the same time produce a cement that is not brittle and subject to cracking, but hard enough to resist forces that roofs are generally subject to, and at the same time elastic enough to expand and contract to suit all conditions of heat and cold, and make the cement water-proof.

C. F. BEVERLY, Lancaster, Ohio.—*Improved Machine for Bending Wood.*—Claim: The stationary mould and arms, for the purpose of bending the stuff from its centre outwards or towards its ends. Also, attaching the arms to an adjustable block, operating in connection with the lever for the purpose of allowing the stuff to be readily inserted or adjusted between the mould and strap; and also, for properly holding the stuff to the mould while the stuff is being acted upon by the rollers of the arms.

CHARLES H. EARLE, Green Bay, Wisconsin.—*An Improvement in Bridges.*—Claim: The supporting of those ends of the several sections of the bridge which are not connected directly with the abutments, by attaching them to cap pieces, or their equivalents, fitted to rise or descend on piers, in combination with the attachment of the sections next the abutments with knuckles or hinges, whereby the bridge is rendered self-adjusting, and prevented being carried away by accumulations of ice, floods, or other causes leading to lift the bridge from its place.

ABRAM S. SWARTZ, Buffalo, New York.—*An Improvement in the Trussed Bridge.*—Claim: The arrangement of the parts so that the tower, the tension-bars, and the suspension-rod, when taken together, will present the distinctive features of a triangle, with the foot of the arch resting upon the tower within the triangle.

BARZILLAI C. SMITH, Burlington, New Jersey. *An Improvement in the Mode of Connecting and Disconnecting the Blocks of Iron or other Pavements.*—Claim: The mode of locking the plates or blocks of iron pavements, the same consisting of the locking-bar and grooves, one of which is of sufficient depth to cover the entire width of the bar, while the other is of half that depth; and in combination therewith I claim the grooves.

* From the condensed lists published in the *Journal of the Franklin Institute* of Pennsylvania.

Books Received.

A Dictionary of Trade Products; Commercial, Manufacturing, and Technical Terms; with a Definition of the Moneys, Weights, and Measures of all Countries, reduced to the British Standard. By P. L. SIMMONDS, F.R.G.S. &c. London: G. Routledge and Co. Farringdon-street. 1858.

IN a commercial and industrial nation such as England, beyond all others, it is surprising that a desideratum such as this should have been so long awanting. Our more elaborate and ponderous commercial dictionaries, one would think, might have ere now suggested the advantages to be derived from a popular and concise work of reference, in one handy volume, on trade terms and the various names under which trade materials and products appear in the market. The idea is an excellent one; and, although a work of this kind never can be complete, it only requires a few successive efforts like the present to render it, in realization, all that can be desired, both for comprehensiveness and accuracy. To this end the author himself is anxious to be favoured with suggestions and corrections for adoption in future editions; but even as it is, this novel work is one of great labour and research, which must have required peculiar facilities for its preparation, and the execution of which appears to have fallen into able hands. It only requires to be known for it to become an indispensable aid to all engaged in general or miscellaneous trading operations, or in any way interested in them. The work already contains, it is said, no less than 22,000 words, the greater number of which are not to be found in any other work of reference; the whole constituting a dictionary of the names of substances or articles, foreign and native, manufactured, imported, exported, bought, sold, or dealt in, at home or abroad. Revision is wanting in one or two paths; but we will not modify our good opinion.

LECTURES AND ESSAYS.

Lectures and Essays on various Subjects, Historical, Topographical, and Artistic. By W. SIDNEY GIBSON, Esq. Barrister-at-Law. Robinson, Newcastle-upon-Tyne; and Longmans and Co. London. 1858.

Essays, Biographical, Historical, and Miscellaneous. By the Rev. G. R. GLEIG, M.A. in two volumes. London: Longmans and Co. 1858.

THE former of these works comprises lectures and papers now for the first time published, and Reviews and Essays which had already appeared in various periodicals. The whole forms a very agreeable volume, with not a little matter of special interest to the readers of the *Builder*. The first is a lecture on poetry and the fine arts, in which the relationship of architecture to sculpture, painting, music, &c. is considered. An Essay on Old Oaks, and other remarkable trees follows. Then a paper on the Inns of Court. There are essays on the Antiquity of the Bell, with notices of remarkable church bells; on the Stone of Destiny in Westminster Abbey; on the Black Rood of Scotland; on London, Past and Present; on Arundel House and the Arundel Marbles; the Renaissance at Alnwick Castle; Bothal Church and Castle; an Archæological Holiday in York, and various others.

The Rev. Mr. Gleig's well-known essays in the *Edinburgh* and *Quarterly Reviews* form the subject of the second work under notice. These essays, as befits an author so connected with the army as is the "Chaplain-General to Her Majesty's Forces," are chiefly of a military caste, such as that on Military Bridges, which contains a good deal of matter of general interest to our own profession; as also does that on our Defensive Armament. Some opportunely relate to India and its Army, the War in the Punjaub, and Military Education; and there are various others, on Natural Theology, on the Puritans, &c. In their present shape they will doubtless have, as they deserve, a wide circulation.

Miscellanea.

CHROMOLITHOGRAPHS.—Sir: May I be allowed a corner of your valuable periodical to enter a protest against the rapidly-increasing mania for chromolithographs and coloured engravings. I am deeply impressed with the conviction that the multiplication of pictures by these means will not advance the public taste, and I much fear that the good likely to be effected by the Turner legacy will be lessened by the mistaken efforts to produce copies of the principal* pictures by chromolithography. Chromolithography has its proper place, which is, as I think, in representing diapers and flat decorations where the variations of colour are not numerous, and the spaces coloured have defined edges; but it is, and ever will be, utterly futile to attempt to follow the hand of a great artist in his management of colour by block printing, however numerous the blocks used may be. If the energy and talent employed in the production of chromolithographs were directed to the improvement of engraving, in which there is much to be done, it would be well.—F. A. M.

CHESTER ARCHÆOLOGICAL SOCIETY.—At the usual monthly meeting of this Society a paper on "The Peculiarities of Cheshire" was read by Major Egerton Leigh. After a few preliminary remarks, Major Leigh said, Cheshire could boast of many peculiarities, and its capital was unique. Commencing with it, he alluded to its principal features, its walls and rows, and the mystery which enshrouded the origin of the rows. In passing along the rows a remarkable feature was to be observed in the double row of shops in some parts, and he hoped that some of the stall-shops would be preserved as a curiosity. He regretted to see so many of the old houses which rested on pillars in the streets removed, and suggested that, under certain regulations, that old style of building should be encouraged in the various approaches to the city. A description of Northwich, and the gradual fulfilment of Nixon's prophecy respecting it, that it would eventually disappear, occupied the next point in the paper. The cause of the subsidence of the soil, the disappearance of roads, hills, and houses was clearly in consequence of the immense quantities of salt which were annually raised from the mines which intersected the town and neighbourhood. It was a curious sight to see the manner in which the houses in this town were propped up by iron bars: the town was literally resting on a crater. Reference was next made to Birkenhead, Knutsford, and other towns in the shire, and the paper closed by allusions to the trees, stones, cheese, products, and provincialisms of the shire.

STRIKE.—At the works in progress at Bull Point, Devonport, forty-five masons engaged by piecework to prepare ashlar facing and nobbling, struck last week for a higher scale of payment. For the former they have been paid 5½d. per foot, and for the latter, 10d. per yard; but they now ask 7d. per foot and 1s. per yard, respectively, which the contractors, Mr. Taver, of London, and Mr. Clift, of Plymouth, refuse to pay.

THE GLASGOW ARCHITECTURAL SOCIETY was inaugurated on Tuesday, the 2nd instant, in the Bath-street Exhibition Rooms. We must postpone notice of the proceedings.

* I use this word somewhat incorrectly; for, setting aside the expediency or otherwise of attempting to copy such pictures as Turner's, I cannot understand on what principle the "Bacchus and Ariadne" was chosen as one of the first to be copied.

INSTITUTION OF CIVIL ENGINEERS.—On the 2nd of March—Mr. Joseph Locke, M.P. president, in the chair—the discussion on Messrs. Longridge and Brooks' paper, "On Submerging Telegraphic Cables," and on Mr. F. C. Webb's paper, "On the Practical Operations connected with Paying-out and Repairing Submarine Telegraph Cables," was commenced, and occupied the entire evening. On the 9th the discussion was resumed.

THE ROYAL MANCHESTER INSTITUTION AND SCHOOLS OF ART.—The council have decided to offer the following Heywood prizes for competition at the next Exhibition of Modern Works of Art at this Institution:—The silver medal, and 20*l.* in money, for the best oil painting (size not less than 20 inches by 12 inches), the original production of a pupil of any school of art within 100 miles of the Institution; a prize of 10*l.* in money for the best chalk drawing, the original production of a pupil of any school of art within 100 miles of the Institution. The competing works must be delivered at the Institution not later than Wednesday, August 4th, and must be accompanied by a descriptive note from the sender, certified by the master of the school to which the party may belong as a pupil. It is satisfactory to find that the Royal Institution shows its sympathy with the progress of the School of Art, its tenant, at 200*l.* or so a-year.

MR. PEISER'S WAREHOUSE, MANCHESTER.—Sir,—In your impression of the 13th ult. in commenting upon "Art and Buildings in Manchester" (p. 97), you assume that Mr. Walters, of whom you had been speaking, was the architect also of my warehouse in George-street. I conceive it but fair on my part to inform you that it is the production of Mr. J. W. Pickard, a young architect who may be benefited by this public notice in your widely-circulated journal.—J. PEISER.

FIRE-GRATES.—Many simple contrivances offer suggestive ideas worth imitation and re-production in other articles in common use: one of these is the apparatus in vogue in our streets for roasting chestnuts. This originally was a candle-shade, for burning candles with safety, when a light is required to be used in an apartment all night. It is commonly of metal, circular, and perforated with holes, somewhat less than a half-crown piece. One may readily see how perfectly the fuel is ignited in these, and that the same glow of heat radiates all round alike. Would not this, therefore, be the best form for the fire-holding portion of a grate, and for all kinds, excepting kitchen-ranges, before which the operation of roasting is performed? The circular holes would prevent the coals tumbling out, as they do now, to an often annoying extent, and should be made of sufficient circumference to admit the use of a poker. Where bars are requisite for a grate, they should be placed in a horizontal position, as keeping the fuel best together in the grate.—SCINTILLA.

MUTUAL LIFE ASSURANCE SOCIETY, LONDON.—In connection with the list of tenders in our last, for the new building for the Mutual Life Assurance Society in King-street, we may add, that Mr. John M. K. Hahn is the architect; and that the quantities were taken out by Messrs. Mekin and Roberts.

OPENING OF NEW DOCKS AT NEWPORT.—Newport, Monmouthshire, was the scene of general festivities on Tuesday in last week, in consequence of the opening of a new dock. The works have been carried out by Mr. Abernethy, C.E. The dock occupies an area of eight acres; length, 950 feet; width, 350 feet: total cost, 64,000*l.* The communication between the old and new docks is by an opening in the north end of the former, made to permit the use of a caisson when occasion requires: seventy-five vessels, averaging 500 tons, may be at one time berthed. Special provision is made for timber vessels. The coal-hoists, turntables, cranes, and capstans will be worked, and the locks opened and shut by hydraulic machinery. Branches in connection with railways running into Newport diverge round the dock, thus giving direct communication with the mineral districts and the port of Liverpool. The day was observed as a general holiday for miles round, the town being thronged with visitors, and processions, dinners, and balls being the order of the day.

THE CHELMSFORD SURVEYORSHIP.—Mr. Fenton having, as recommended by the Sanitary Committee, given in his resignation to the Local Board of Health, the Board have elected Mr. Frederick Chancellor, late one of their own members, to the vacant office. Mr. Chancellor in thanking the Board, said, that with their assistance, he hoped to be enabled to discharge his duties with as much satisfaction as his predecessor.

ELECTRO-TELEGRAPHIC PROGRESS.—Meetings are being held in Jersey and Guernsey for the promotion of a Channel Island telegraph, which Messrs. Newall and Co. have offered to lay down for about 20,000*l.* of which one-half would be taken by themselves and friends in shares. The Government have also promised aid to a respectable company.

COTTAGE WINDOW-FRAMES: ROYAL SCOTTISH SOCIETY OF ARTS.—At a recent meeting of the Royal Scottish Society of Arts, an improved cottage window-frame, by the Hon. Lord Murray, was communicated by Professor C. Piazzi Smyth, V.P.; illustrated with examples in iron and wood. The object which Lord Murray had in view was to provide efficient ventilation without the several inconveniences of either the sash or the hinge principle, effecting this by making one-fourth of the window slide horizontally, so that, while it allows adjustment in quantity of opening, it hardly admits of any possibility of the arrangement getting out of order. His lordship's invention was exhibited to the meeting in the shape of a wooden model, as well as of a full-sized cast-iron window-frame with sixteen small panes.

A NEW FEVER HOSPITAL FOR LIVERPOOL.—There being no other fever hospital at Liverpool besides that connected with the workhouse, measures are being taken for the establishment of a self-supporting fever hospital, and at a very large meeting held last week appropriate resolutions were unanimously passed in favour of the project, and a subscription list at once opened.

BRADFORD COLLEGE COMPETITION.—After examination of the designs received in competition, that bearing the motto, "Sit præmium primo," was selected by the committee as the most suited to the purpose. On opening the sealed envelope, the author was found to be Mr. H. J. Paull, of Cardiff. The work is to be carried out under his superintendence. The estimated cost is 6,000*l.*

UPPER HOLLOWAY.—A church, to be called St. George's, Tufnel-park, is to be erected at Upper Holloway: in the meantime, a temporary one of wood, with an effective interior, to hold 900 persons, having been approved of by the Board of Works, is in course of construction. Mr. George Truefitt is the architect; Messrs. Evans Brothers, the builders. The contract—the lowest of three sent in—is for 670*l.* with 4 per cent. additional to complete in six weeks, instead of eight, as at first proposed.

ARCHITECTURAL MUSEUM.—On the 10th Mr. Raphael Brandon read a paper "On Ancient Timber Framing," to which we shall return.

TENDERS.

For a House at Chichester, for Mr. J. Johnson. Mr. W. Mitford Teulon, architect. Quantities not supplied:—

Wardle and Baker	£3,980	0	0
Johnson	3,834	0	0
Wm. Hill	3,712	0	0
Chandler	3,557	0	0

For Infant Schools, Hackney. Mr. M. A. Gliddon, architect:—

Myers	£1,780	0	0
Holland	1,325	0	0
Piper	1,227	0	0
Norris	1,057	0	0
Little	1,019	0	0
Carter	890	0	0
Callow	779	0	0

For a Chapel-of-Ease, at St. John's-hill, Seven Oaks. Messrs. Morphew and Green, architects. Quantities not supplied:—

Marchant and Coleman	£1,200	0	0
Howe	1,050	0	0
Burton	977	0	0
Evans (Brothers)	975	0	0
Sutton and Co.	945	0	0
Smith	915	0	0
D. and J. Grover	896	0	0
Dadley	847	0	0
G. Punnett (including bell not specified)	841	0	0
T. and W. Barker	820	0	0

For new Fittings and Decorations, the Sussex Tavern, Leadenhall-street. Messrs. Young and Son, architects:—

Scott	£471	0	0
Westacott	465	0	0
King	410	0	0
Drew	399	0	0
Piper and Son	397	0	0
Shaw	383	0	0

For building Two Houses, at Kilburn, under Mr. H. W. Sass, architect. Quantities supplied:—

	As first intended.			Omitting Beer-shop.		
Green	£825	0	0	£810	0	0
Roberts and Crook	802	19	8	777	19	8
Brown	782	5	7	760	13	0
Wicks	776	15	8	742	15	8
Robinson	745	0	0	725	0	0
Batterbury	698	0	0	678	0	0

For the completion of ten houses, in Elgin-crescent, Notting-hill, for Mr. E. E. Boyd. Mr. William Sim, architect:—

Dove, Brothers	£2,735	0	0
Cowland	2,443	5	0
Fish	2,422	0	0

TO CORRESPONDENTS.

DISTEMPER.—SIR: What is the best mode of preparing material for distempering the ceilings of halls, staircases, &c.? in what proportion should the ingredients be mixed, and how applied, so as to render the work, when complete, effective and permanent? Any information on this subject will greatly oblige.—J. C.

J. M. A. Liverpool (all the numbers can be had excepting those for January 17th and 24th).—J. W.—R. A. A. (will see he has been forestalled to some extent).—W. H.—C. C. (try Newman, Regent-street).—Fiat.—S. E. R.—A. W.—W. T. (substance has already appeared).—B. P.—J. R. (we shall be most glad to hear from him).—J. C. jun. (any communication will have attention).—R. R. R.—R. H. D.—R. B.—L.—T. G.—J. A. P.—Dr. L.—The Workman's Friend (we have already referred to the vice).—Mr. T.—J. B. N.—J. M. T.—J. H. (shall have attention).—A. W.—A Novice (multiply the number of feet of 9-inch work by 2, and divide by 3, which will of course bring it to 1½ brick work. He must look to rudiments).—T. C.—J. G. S. (no general direction can be given, discretion must of course be exercised. Less harm will be done by too freely opening the windows than by too constantly keeping them shut).—L. and B. (the list of tenders was given on the best authority).—Rev. J. B.—W. G.—Dr. M.—A Joiner.—J. H.—M. B. N.—J. J.—J. E. G.—W. N.—M. and G.—R. R.—T. D. B.—Inquirer (the two societies are distinct. The north angle is preferred, but neither is wrong).

"BOOKS AND ADDRESSES."—We are forced to decline pointing out books or finding addresses.

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